

July 2000 Update for Areas of Concern



An Updated Summary of Contaminated Sediment  
Remediation Activities at Great Lakes  
Areas of Concern



Great Lakes National Program Office  
July 2000

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## **BACKGROUND**

Contaminated sediments are of great concern to humans and wildlife that live within the Great Lakes Basin. Years of industrial and municipal discharges, combined sewer overflows and urban and agricultural non-point source runoff have contributed to the creation of vast amounts of highly polluted sediments that pose serious human and ecological health risks. Sediments have been collecting on the bottoms of the Great Lakes ever since they were formed by glacial scouring and melting. The loose, unconsolidated particles that make up the sediment may originate in soil worn away by physical or chemical erosion, or they may come from the decomposition of shells or wood chips. In areas of slow moving water, sediments sink and accumulate on the bottom of lakes and rivers.

Before industry came to the Great Lakes Basin, the natural processes of sedimentation only created changes in the shapes of the lakes and their tributaries. However, in the first century of industrial development, the region began adding chemicals to the water, and in turn, the sediments. Often the approach was simply to run a pipe to the nearest river bank of lakeshore and pump the waste directly into the water. Over the decades, heavy metals and toxic organic chemicals mixed with the particles of rock, soil, and decomposing wood and shell in the sediments collecting in rivers and harbors in the Great Lakes Basin.

Even after serious cleanup efforts began in the late 1960s, little attention was paid to the toxics concealed on the bottom. The first priority was to stop the discharge of new contaminants, and little concern was paid to sediments. It was not until the early 1980s that environmental problems caused by sediment contamination began to generate interest. One example was an increase in concentrations of the pesticide DDT and the widely used group of industrial chemicals called PCBs in the tissues of Great Lakes fish. Although both of these chemicals had been banned from use within the Basin in the 1970s, levels were still increasing in fish tissue. This development sparked interest in the possibility of the sediments as sources of the toxics. Overwhelming evidence now supports the theory that toxics trapped in sediment can adversely impact humans and the environment. By a process known as biomagnification the toxics contained in bottom sediments can increase exponentially in concentration at every level of the food chain, starting with the sediment dwelling benthos, continuing to fish and eventually reaching birds of prey, mammals and even humans. This bioaccumulation of sediment pollutants in fish is one way for humans to become affected by the in-place contaminants.

In response to rising concern regarding sediment quality in the Great Lakes, the U.S. Congress authorized a five-year study and demonstration project to identify the best techniques for addressing contaminated sediments. The authorization, contained in the Clean Water Act of 1987, called upon the Great Lakes National Program Office of the U.S. EPA to conduct a study and demonstration project relating to the appropriate treatment of toxic pollutants in sediments. Also in 1987, the U.S. and Canada ratified a second revision of their 1972 Great Lakes Water Quality Agreement which directed the U.S. EPA and its counterpart, Environment Canada, to establish methods to quantify, manage and remediate contaminated sediments.

In response to both policies, U.S. EPA created the Assessment and Remediation of Contaminated Sediments (ARCS) Program. The specific aims of the ARCS Program were to measure concentrations of contaminants at chosen sites on the Great Lakes, to determine ways of gauging the effects of these concentrations on aquatic life, to recommend ways to measure risks to wildlife and to human health posed by the contaminants and to test technologies that might be used to clean up the sediments. Since the onset of the ARCS Program, state and federal agencies, environmental groups, industries and local citizens

have worked together to identify contaminated sites, develop remediation plans and restore the sediments to safe levels for the ecosystem at numerous locations around the Basin.

As the process of realizing remediation occurs, it is important to keep all stakeholders apprised of actions that have been accomplished as well as to look ahead to the future. This document presents a summary of contaminated sediment remediation activities at Great Lakes Areas of Concern. The summary demonstrates how far sediment remediation in the Great Lakes has progressed since the identification of contaminated sediment problems. It is hoped that this document will serve as a reference and promote information networking among the many people and agencies who work on remediating the Great Lakes sediments.

This report is intended to provide updated information for Great Lakes Areas of Concern (AOCs), to supplement the original report entitled "Realizing Remediation", dated March 1998. This update highlights progress which has been made at those sites which were described in the original report that fall within an AOC, and it includes some additional AOCs which were not incorporated in the March 1998 report where progress is being made toward remediation. Six additional AOCs are included in this report, and information has been added on progress at twenty-five sites in the seventeen AOCs previously reported. Summary tables also include updated cost and volume information.

**Table 1: Sediment Volumes and Remediation Costs for Current and/or Completed Sites**

Site	Sediment Volume (yds <sup>3</sup> )	Sediment Remediation Costs (\$US)	Total Project Costs (\$US)
Waukegan Harbor	32,000	\$21,000,000	
Grand Calumet River/Indiana Harbor AOC: LTV Steel	116,000	\$14-16,000,000	
Detroit River AOC: Monguagon Creek	25,128	\$3,000,000	
Kalamazoo River AOC: Allied Paper Site	150,000		
Manistique River and Harbor	90,000	\$36,000,000	
River Raisin AOC: Ford Monre Outfall Site	27,000	\$6,000,000	
Rouge River AOC: Evan's Product Ditch Site	7,000	\$550,000	
Rouge River AOC: Newburgh Lake	400,000		\$11,800,000
Rouge River AOC: Double Eagle Steel	34,500	\$1,000,000	
St. Marys River AOC: Cannelton Industries	3,000		
Niagara River AOC: 102 <sup>nd</sup> Street Embayment	28,500		\$30,000,000
Niagara River AOC: Buffalo Color - Area D	45,000		\$8,000,000
Niagara River AOC: Frontier Chemical - Pendleton	56,000		\$18,770,000
Niagara River AOC: Gill Creek - DuPont Site	8,020	\$10,000,000	\$40,000,000
Niagara River AOC: Gill Creek - Olin Industrial Welding	6,850	\$1,400,000	
Niagara River AOC: Bloody Run Creek - Hyde Park Landfill	27,000		\$58,000,000
Niagara River AOC: Iroquois/Westwood	17,500		\$8,000,000
Niagara River AOC: Black and Bergholtz Creeks	17,200	\$14,000,000	
Niagara River AOC: Niagara Mohawk	42,000	\$3,000,000	\$11,000,000
Niagara River AOC: Niagara Transformer	11,500		\$5,600,000
Niagara River AOC: Pettit Flume - Durez-Occidental	15,070		\$23,000,000
Niagara River AOC: Union Road	5,600		\$8,000,000
St. Lawrence River AOC: ALCOA Site	3,500	\$4,800,000	
St. Lawrence River AOC: General Motors Site	13,800	\$7,000,000	\$78,000,000
Black River	50,000	\$1,500,000	
Maumee River AOC: Unnamed Tributary to Ottawa River	8,000	\$5,000,000	
Fox River AOC: Deposit 56/57	30,000	\$9,000,000	
Fox River AOC: Deposit N	7,200	\$4,000,000	
Menominee River AOC: Ansul Incorporated	13,000	\$5,000,000	
Milwaukee Estuary AOC: North Ave. Dam of Milwaukee R.	8,000		\$4,700,000
Milwaukee Estuary AOC: Ruck Pond	7,700	\$7,080,000	
Sheboygan River and Harbor - Tecumseh Products	3,800		

**Table 1: Total Yds<sup>3</sup> for the current or finished sediment remediation projects in the U.S. Great Lakes Areas of Concern. The cost figures are denoted either as the cost for the sediment remediation portion of the project, or for the land based cleanup and sediment remediation combined.**

**Table 2: Estimated Sediment Volumes and Predicted Costs for Future Remediations**

Site	Sediment Volume (yds <sup>3</sup> )	Sediment Remediation Costs (\$US)
Deer Lake	400,000	Unknown
Saginaw River	350,000	\$8-9,000,000
Torch Lake	Unknown	Unknown
White Lake	80-100,000	\$4-8,000,000
St. Lawrence River AOC: Reynolds Metals Site	77,000	\$57,000,000
Ashtabula River and Harbor AOC: Fields Brook Superfund Site	12,100	\$5-6,000,000
Ashtabula River and Harbor AOC: Downstream of Fields Brook	500,000	\$42,000,000
Milwaukee Estuary AOC: Little Menominee River	15,000	\$12,000,000
Sheboygan River and Harbor	75,000	\$41,000,000

## **PAST AND CURRENT PROJECTS AT AREAS OF CONCERN**

### **Waukegan Harbor - Outboard Marine Corporation Site**

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#### **Location**

The Waukegan Harbor Superfund Site in Waukegan, Illinois is within an Area of Concern (AOC) designated by the International Joint Commission (IJC). Waukegan is located approximately 50 miles north of the city of Chicago along the Lake Michigan shoreline.

#### **Background**

Outboard Marine Corporation (OMC), a recreational marine products manufacturer, used hydraulic fluid containing PCBs in its dye-casting machines from 1959 to 1972. Some of the PCBs escaped from the oil interceptor, diversion and pump system. The PCBs were discharge from two locations, one at the western end of Slip 3 at the northern end of Waukegan Harbor, and one at the north end of OMC property to the North Ditch, which runs directly into Lake Michigan. By the time the discharge pipe to the harbor was sealed in 1976, approximately 300,000 pounds of PCBs had been released into Waukegan Harbor, and another 700,000 pounds had been discharged on OMC property. PCB concentrations in some areas were over 25,000 ppm. It was also estimated that hundreds of thousands of pounds of PCBs discharged into Lake Michigan.

#### **Administrative History**

The Illinois Environmental Protection Agency conducted effluent sampling of outfalls on Lake Michigan to attempt to identify sources of PCB contamination. In January 1976, samples taken during 1975 at outfalls at the Outboard Marine Corporation (OMC) of Waukegan, Illinois were found to be contaminated with PCBs, discharging at a rate of 9 to 10 pounds of PCBs per day.

A remedy was selected in 1984 by the U.S. EPA which authorized \$21 million for the cleanup program. Three main areas of contamination were targeted for remediation: the Upper Harbor and Slip 3; the OMC parking lot; and the North Ditch/Crescent Ditch/Oval Lagoon area. However, components of the remedy were modified and embodied in a 1988 Consent Decree. In March 1989, the Record of Decision (ROD) was correspondingly modified and the Consent Decree was then entered into the United States District Court in April 1989. By terms of the Consent Decree, OMC was to finance a Trust to implement the cleanup and to ensure performance of the requirements of the Consent Decree.

The final remedy required the following:

- A slip was built on the east side of the Upper Harbor to replace Slip 3. Larsen Marine was relocated from Slip 3 to this new slip.
- A double sheet pile cut-off wall was built to isolate Slip 3 from the Upper Harbor. A watertight clay slurry wall was anchored to the underlying clay till and Slip 3 became a permanent containment cell.



- A total of 8,000 cubic yards of sediment in Slip 3 with PCB concentrations above 500 ppm was removed and isolated for treatment. Approximately 30,000 cubic yards of sediment in the Upper Harbor with PCB concentrations between 50 and 500 ppm was removed and placed in the new Slip 3 containment cell.
- Two other containment cells were built with a similar design as the Slip 3 containment cell. One encompasses the parking lot, and the other encompasses the Crescent Ditch and Oval Lagoon. Before construction, all areas containing PCB contamination over 10,000 ppm were removed for treatment.
- Material removed from designated hotspots was treated by a low temperature extraction procedure which removed at least 97% of the PCBs by mass to separate the PCB oils from the sediments.
- Extracted PCB oil was removed off-site for destruction at a TSCA-approved facility.
- Residual treated soil was placed in the containment cells which were closed and capped.
- All water generated during remedial activities was treated on site.

In the Fall of 1989, during pre-design field investigations, additional contamination in the form of polynuclear aromatic hydrocarbons (PAHs) were discovered in the soil area of the new slip. PAHs reflect coking and wood treating operations. This contamination resulted from a previous land use prior to OMC's ownership of the property. The discovery of PAHs required a limited investigation in the area of the new slip and resulted in the removal of PAH-contaminated soils above 5 ppm.

#### **Amount of Contaminated Sediments**

- Volumes: 32,000 cubic yards removed from Waukegan Harbor  
6,300 cubic yards removed from Slip #3  
5,000 cubic yards removed from the North Ditch  
2,900 cubic yards of sediment and soil removed from Oval Lagoon  
3,800 cubic yards of sediment and soil removed from Crescent Ditch
- Mass: 1,000,000 pounds (estimate)
- Highest PCB Concentration: 500,000 ppm

#### **Project Status**

Physical construction was completed as of February 1992. Operation and maintenance of the site is ongoing. Monitoring indicates that fish tissue contaminant concentrations in the harbor continue to decrease. Warning signs from within the harbor have been removed because sampling has recently shown declines in concentrations to the same level as the greater Lake Michigan area. Compliance monitoring continues to show the remedy is meeting its objectives.

#### **Total Cost**

The cleanup cost of the entire remediation effort was estimated to be approximately \$21,000,000.

#### **Post-Remediation Monitoring**

The United States Geological Survey conducted a post-remediation evaluation of the toxicity and bioaccumulation of contaminants in Waukegan Harbor sediments. The results of this study show that the remediation at Waukegan Harbor successfully lowered concentrations of PCBs at the site. In addition, the study found the sediment in the harbor to be less toxic than harbor sediment prior to remediation. The Illinois EPA has also conducted some post-remediation monitoring, which demonstrates a significant decline in PCB levels in fish at Waukegan Harbor.

## **Indiana Harbor - LTV Steel Site**

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### **Location**

The LTV Steel Site is located along the south shore of Lake Michigan in the city of East Chicago, Indiana. It is part of a heavily industrialized corridor adjacent to Indiana Harbor and is part of the Grand Calumet River/Indiana Harbor AOC.

### **Background**

Indiana Harbor has long been used for industrial manufacturing and is considered by many to be one of the most seriously polluted AOCs. This particular stretch of the coast was used by LTV Steel, which discharged waste oils and heavy metals into Lake Michigan. Historic pollution from numerous other sources have also contributed to the degradation of this site. Sampling of the sediments has found contamination levels greater than 50 ppm PCBs. The majority of the contamination is located within LTV's intake flume.

### **Administrative History**

Actions were taken against LTV Steel for their violations of the Clean Water Act (CWA). The remediation of the LTV Site is now being performed under a 1991 CWA Consent Decree. The lead agency on the remediation work is U.S. EPA Region 5.

### **Amount of Contaminated Sediment**

- Volume: 116,000 cubic yards
- Recovered 40,000 cubic gallons of oil

### **Project Status**

This project has been completed. The contaminated sediment was excavated using a hydraulic dredge, and the oil was separated and recovered from the sediment.

### **Total Cost**

The costs are estimated to be between \$14 million and \$16 million for the project.

## **Detroit River - Monguagon Creek**

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### **Location**

Monguagon Creek is a tributary to the Detroit River. Monguagon Creek joins the Detroit River south of the cities of Detroit and Windsor in Riverview. The total length of the creek is approximately 0.7 miles.

### **Background**

Sediments in Monguagon Creek were contaminated by historical point and nonpoint source discharges associated with steel and chemical manufacturing activities. Contaminants include polynuclear aromatic hydrocarbons (PAHs), amines, phenols, PCBs, lead and zinc. Monguagon Creek has received wastewater discharges from industrial facilities as well as surface runoff from the town of Riverview. The main industrial discharger to the creek for many years was Elf Atochem North America, Inc. (formerly Pennwalt Chemical WestPlant). That site has been involved in the production of pesticides, phenols and organic amine compounds. However, the discharge from Elf Atochem was recently rerouted from Monguagon Creek to the Detroit River.

### **Administrative History**

The Detroit River AOC identified Monguagon Creek as a site of environmental contamination in 1991 because of the contaminated sediment in the creek. After sampling by both the MDEQ and the PRPs, as well as investigation reports by both sides, the cleanup was conducted under a December 1996 voluntary agreement between MDEQ, Elf Atochem North America, Inc., Bridgestone/Firestone, Inc., and Jones Chemicals, Inc. Elf Atochem North America, Inc. financed a bulk of the project.

### **Amount of Contaminated Sediments**

- Volume: 25,182 cubic yards

### **Project Status**

The remediation project was completed on June 30, 1997. MDEQ staff surveyed the creek in November of 1997 to gather post-remediation samples. They concluded that the bulk of the contaminated sediment had been removed, but contaminated residuals still remained at various locations. MDEQ officials have recommended a follow-up plan for action from Elf Atochem for further assessment of the area and possible further remedial actions.

### **Total Cost**

The cost of the sediment remediation was approximately \$3,000,000.

## **Kalamazoo River - Allied Paper**

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### **Location**

The Kalamazoo River flows across the southwestern portion of the lower peninsula of Michigan. The river flows in a westerly direction and discharges into Lake Michigan near the town of Saugatuck. The lower eighty miles of the Kalamazoo River have been identified as an AOC, due to historic releases of PCBs from de-inking operations at local paper mills.

The Allied Paper, Inc./Portage Creek/Kalamazoo River Site involves PCB contamination of: (1) an Allied Paper, Inc. property in Kalamazoo, Kalamazoo County, Michigan, (2) a 3-mile stretch of Portage Creek from Kalamazoo to where the creek meets the Kalamazoo River, and (3) a 35-mile stretch of the Kalamazoo River.

### **Background**

Allied Paper, Inc., a subsidiary of SCM Corporation, has operated paper mills on an 80-acre property at 2030 Portage Road in Kalamazoo since 1925. From 1957 to 1971, the company recycled and de-inked paper, including carbonless copy papers, which contained 3.4 percent PCBs by weight.

In 1986, MDNR detected PCBs in several places in the 80-mile stretch of the Kalamazoo River between Kalamazoo and Lake Michigan. Contamination is primarily in the sediments, although the water column and fish are also affected. According to MDNR, the contamination begins at the point where Allied's Bryant Mill Pond discharges into Portage Creek.

### **Administrative History**

Since the PCB contamination was identified as a problem, several actions have been taken to improve conditions. The discharge of PCBs has been substantially reduced due to the ban on PCB production, and other regulatory point source controls, such as the NPDES permit program. However, contaminated sediments in the upstream areas still serve as a source of PCBs to the Kalamazoo River.

On December 2, 1987, the State filed a complaint under CERCLA Sections 107 and 113, the Resource Conservation and Recovery Act, the Federal Water Pollution Control Act, the Toxic Substances Control Act, and three Michigan laws. The complaint called for Allied Paper and SCM Corporation to stop the release of hazardous substances into the environment and pay cleanup costs. In response, the companies have undertaken studies of the extent of the PCB contamination, the quantities of PCBs in Bryant Mill Pond, and possible remedial actions. In August 1990, the Allied Paper/Portage Creek/Kalamazoo River Superfund Site was included on the National Priority List pursuant to CERCLA. The site includes Portage

Creek, from Cork Street just above the Bryant Mill Pond to its confluence with the Kalamazoo River; and the Kalamazoo River from this confluence downstream to the Allegan City Dam. The area listed includes a three mile stretch of Portage Creek and a 35 mile stretch of the Kalamazoo River. However, because the data indicate the PCBs have migrated downstream, the Superfund Remedial Investigation includes the area from Morrow Dam to the mouth of the Kalamazoo River.

**Amount of Contaminated Sediments**

- Volume: 150,000 cubic yards removed
- Mass: 20,000 pounds of PCBs removed

**Project Status**

The Allied Paper Bryant Mill Pond Site was remediated under a Superfund Emergency Removal Action in 1999. 150,000 cubic yards of contaminated sediment were removed from the site, including 20,000 pounds of PCBs. Consolidation of landfills, as well as installation of sheet piling and rip rap for bank stabilization, are expected this year.

## **Manistique River and Harbor**

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### **Location**

The site is located within the city of Manistique in Schoolcraft County, Michigan. Manistique is along the southern shores of Lake Michigan's Upper Peninsula. The site is bounded on the east and west by the banks of the Manistique River, on the south by Lake Michigan, and on the north by a dam upstream of the Manistique Paper, Inc. facility. The remediation site is along a 1.7-mile stretch of the river and spans the entire width of the Manistique. The site does not include the riverbanks and properties along and adjacent to the river. The site also does not include the area which formerly contained Manistique Papers, Inc.'s sludge de-inking lagoon.

### **Background**

Historically, the Manistique River and Harbor Site received water from sawmills, a paper mill, industry and a municipal wastewater treatment plant. Wastes such as paper, wood, chemicals, de-inking waste, and oil from industrial users were discharged into the area. Undecomposed sawdust and woodchips still remain in the sediments from logging over a hundred years ago. The PRPs (Potentially Responsible Parties) involved with this site are Manistique Paper, Inc., Edison Sault Electric, and Warshawsky Brothers Iron and Metal. The site has been monitored and evaluated by state and federal agencies since the 1970s. The principal sediment contaminant identified by these agencies has been PCBs.

### **Administrative History**

The Manistique Site is being remediated under a Superfund Emergency Removal Action. U.S. EPA determined it could not wait for remedial action by the companies involved because approximately 100 pounds of PCBs were being washed into Lake Michigan through natural erosion processed annually. U.S. EPA's Decision of Response was made within an Action Memorandum which approved dredging as the environmentally preferable option.

In December 1996, U.S. EPA and the PRPs entered into an Administrative Order of Consent. This legally required the PRPs to commit financial resources for the project. The Order also included a covenant not to sue for any further remedial costs for the dredged areas incurred in the future.

The final settlement agreement was signed between the PRPs and U.S. EPA on April 21, 1997. This settlement resolved the PRPs of liability in exchange for \$6.4 million and other services, such as access to land and material during the dredging.

### **Amount of Contaminated Sediments**

- Volume: 90,000 cubic yards removed (approximately)

**Project Status**

The Manistique River and Harbor Site is currently in the remedial process. The contaminated sediments are being removed, primarily through the use of a hydraulic cutterhead dredge as well as some diver-assisted dredging. All sediment exceeding 10 ppm PCBs is being removed and taken off site for disposal. Non-TSCA materials are taken to Wood Island Landfill in Munising, Michigan. In 1996, TSCA materials were transported to Idaho for disposal; currently, TSCA materials are sent to Environmental Quality/Wayne Disposal in Belleville, Michigan.

Approximately 90,000 cubic yards of contaminated sediments have been removed from the river and harbor since dredging began in 1996. Dredging is expected to continue this year.

**Total Cost**

Thus far, the Manistique River and Harbor cleanup has cost \$36 million.

## **River Raisin - Ford Monroe Outfall Site**

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### **Location**

The River Raisin Area of Concern is located in the southeastern portion of Michigan's lower peninsula in Monroe County. The AOC has been defined as the lower (2.6 miles) portion of the River Raisin, downstream from the low head dam (Dam #6) at Winchester Bridge in the City of Monroe, extending one-half mile out into Lake Erie following the Federal Navigation Channel and along the nearshore zone of Lake Erie, both north and south, for one mile.

The Ford Outfall Site is located within the AOC. It is part of the industrial area of Monroe, Michigan on property associated with the Ford Monroe Stamping Plant. The site is bordered along the north by wetlands and Sterling State Park, along the east by Lake Erie, along the south by the River Raisin, and along the west by more wetlands.

### **Background**

The Ford Monroe Plant began manufacturing automotive parts at the site in 1949. Until the 1970s all wastewater from the plant was discharged through several outfalls directly into the River Raisin, which empties into Lake Erie at Monroe Harbor. Most of the wastewater was generated by cleaning, painting and plating processes containing PCBs. After the early 1970s, the outfalls were closed and new ones were constructed further downstream. The industrial waste from this site has contributed to a loss of fish and wildlife habitat within the AOC. In the 1970s and 1980s, PCBs were detected in the river sediments in the 1-25 ppm range. However, another study conducted by Michigan State University in 1991 found PCB levels up to 42,167 ppm in the sediment near the outlet of a former Ford Motor Company. Through the use of U.S. EPA's Research Vessel *Mudpuppy*, a number of sediment core profile and grab samples were taken at, above and below the PCB hot spot area. EPA staff also collected samples for PCB analysis on Ford's property. U.S. EPA's study, which was conducted in 1992, confirmed the results of the study previously conducted by Michigan State that revealed high levels of PCBs in the wastewater, as well as in the fish in the river.



### **Administrative History**

Since 1973 the site has undergone continuous investigation by either U.S. EPA or MDEQ. As cited above, the EPA conducted additional sediment sampling in the AOC in September of 1992. The lower River Raisin was identified by the IJC as one of Michigan's fourteen AOCs due to PCB and heavy metal contamination (zinc, chromium and copper) of the water column, sediments, and fish. The site was remediated under a Superfund Emergency Removal Action.

### **Amount of Contaminated Sediments**

- Volume: 27,000 cubic yards
- Highest PCB Concentration: 49,000 ppm

### **Project Status**

The in-plant sewer material was remediated with a combination of hydraulic, mechanical and pneumatic methods during July 1996. The sediment remediation phase began in July 1997 and was completed in October 1997. As previously mentioned, the sediment was removed by mechanical dredging, stabilized/solidified, and then contained in an on-site TSCA certified facility.

Only the hot spots have been remediated; however, Remedial Action Plans have been drafted for other areas in the contaminated stretch of the river. A survey was completed in 1998 by the MDEQ, and significant concentrations of PCBs were found remaining in the remediated sections and other areas of the river. Further investigations are planned for this calendar year with an eye towards remediation of the rest of the contaminated spots and the areas that have already been dredged. Borings are planned in order to gain mass/volume estimates. This information will help MDEQ to develop cleanup specs for this AOC.

### **Total Cost**

The cost of the sediment remediation was approximately \$6,000,000.

## **Upper Rouge River - Evan's Product Ditch Site**

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### **Location**

The oldest and most heavily populated and industrialized area in southeast Michigan is located within the Rouge River Watershed. The Rouge River has four main branches totaling 125 miles of waterways primarily flowing through Wayne and Oakland counties, with some headwaters in Washtenaw County. The Rouge drains a 438 square mile area that includes more than 400 lakes and ponds, and more than 50 miles of park land along its banks.

The entire Rouge River is designated as one of IJC's Areas of Concern. The Evan's Product Ditch Site is slightly upstream of Newburgh Lake, which is located on the Middle Rouge River in the City of Livonia, Michigan.

### **Background**

The Rouge River was once a vibrant waterway that provided a variety of uses to people, plants, animals, and insects. This waterway attracted industry and people as the metropolitan Detroit area developed over sixty years ago. In 1988, a routine fish collection from Newburgh Lake in the Upper Rouge River found PCB levels in the fish tissue as high as 26 ppm. In 1992, the Michigan Department of Environmental Quality (MDEQ) identified the PCB source as a stormwater ditch located on the bankrupt Evan's Products Company property, formerly Plymouth Industries. The current owners, Premier Realty, stopped the PCB discharge by pouring cement into the power house pipes. By this time, however, there had been widespread contamination of the Rouge River and of the sediments in Newburgh Lake, particularly in the western end.

### **Administrative History**

The MDEQ, working with EPA, determined that a major source of PCBs in Newburgh Lake sediments were being transported and deposited through a storm water ditch that discharged into Middle Rouge River (Newburgh Lake) at the headwaters of the lake. Since the PRP involved had filed for bankruptcy, the burden of remediation fell to the state. The remediation effort was led by MDEQ and was conducted in the winter of 1997.

### **Amount of Contaminated Sediments**

- Volume: 7,000 cubic yards (estimate)
- Mass: 9,500 tons
- Highest PCB Concentration: 22,000 ppm

**Project Status**

Remediation began in January 1997, under management of MDEQ. All of the contaminated sediments were removed by April 7, 1997. The 1,787.36 tons of TSCA-level material was sent to Model City, NY for disposal. The rest of the removed sediments (7,718.6 tons) was taken to a Type II landfill in Michigan.

The entire stormwater ditch was excavated to a depth of at least 3 feet and ditch banks were excavated up to 15 feet away from the original channel. Clean sediments were verified and excavations were covered with 3 feet of clean soils. The northern half of the waterway was also diverted to avoid any undetected PCBs in the sediments. Completion of this project also paved the way for remediation to begin at Newburgh Lake.

**Total Cost**

The project was completed using State of Michigan Bond Funds, due to the company's filing for bankruptcy. The preliminary estimated cost for remediating Evan's Product Ditch Site was \$550,000.

## **Rouge River - Newburgh Lake**

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### **Location**

Newburgh Lake is an impoundment in the Rouge River Watershed, and is included in the original Rouge River Remedial Action Plan (RAP), published in 1989, which called for a strategic plan to clean up the Rouge River. Newburgh Lake covers 105 acres and is located on the Middle Rouge River in the city of Livonia in Wayne County, Michigan. The lake is part of the Wayne County Park System's Edward Hines Parkway.

### **Background**

The Rouge River Watershed is the oldest and most heavily populated and industrialized area in southeast Michigan. Newburgh Lake was created in the 1930s as part of Henry Ford's "Village Industries" on the Rouge River. After building a mill and dam with assistance from Wayne County Roads Commission in 1933, Ford deeded Newburgh Lake to the Commission for inclusion of Hines Park. The history of the lake encompasses over 60 years of sediment accumulation, some contaminated with pollutants, which over time degraded Newburgh Lake's water quality. The lake's degraded water quality is attributed to combined sewer overflows, polluted stormwater runoff and industrial discharges, among other sources. Some of the major environmental hazards identified include excessive levels of bacteria, heavy metals, organic chemicals and other substances such as PCBs. Large amounts of PCBs were discovered in the lake sediments by MDEQ in 1988. These PCBs were released from the Evan's Product Ditch Site, just upstream from Newburgh Lake. Due to the elevated levels of PCBs in the sediments, the Michigan Department of Public Health has issued a fish consumption advisory for Newburgh Lake.

### **Administrative History**

By the mid-1980s residents of Southeast Michigan demanded that MDEQ do something to clean up the Rouge River. As a result, MDEQ developed the Rouge River Basin Strategy, which was further adopted by State Water Resource Commission in October 1985. PCBs were first reported in Newburgh Lake fish in 1988. Following a study by Michigan Department of Natural Resources (now Michigan Department of Environmental Quality), the MDEQ referred the site to EPA in June 1995 to further assess contamination at the site. Wayne County Department of Environment coordinated Newburgh Lake's remediation. Due to the elevated levels of PCBs in the sediments, the Michigan Department of Public Health issued a fish consumption advisory for Newburgh Lake. The remediation was conducted as part of the Rouge River Wet Weather Demonstration Project (RRWWDP), which involved the implementation of a water quality model to predict pollutant source loadings on the watershed level. Wayne County began restoration of Newburgh Lake in April 1997, to dredge the lake of PCBs, other hydrocarbons and metals.

**Amount of Contaminated Sediments**

- Volume: 400,000 cubic yards
- Mass: 544,000 tons
- Highest PCB Concentration: 51 ppm

**Project Status**

In the spring of 1997, Environmental Consulting and Technology, Inc. conducted a fish kill to remove the PCB-contaminated fish. Wayne County began restoration efforts in October 1997, by dredging the lake of sediments containing PCBs, other hydrocarbons and metals. The sediment removal was completed in 1998. Approximately 400,000 cubic yards were removed. This figure included 3,400 pounds of PCBs, heavy metals and other organics. The contaminated sediment was taken off site for disposal. Some of the excavated clean sediment was used to re-nourish the shoal areas and an existing island.

In October 1998, Wayne County's Newburgh Lake restoration project was completed and the County celebrated with a grand reopening of Newburgh Lake.

**Total Cost**

The project was funded with grant funds made available by EPA grant awards to Wayne County for the Rouge River National Wet Weather Demonstration Project. Total costs associated with the Newburgh Lake restoration project is \$11.8 million.

## **Lower Rouge River - Double Eagle Steel**

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### **Location**

The oldest and most heavily populated and industrialized area in southeast Michigan is located within the Rouge River Watershed. The Rouge River has four main branches totaling 125 miles of waterways primarily flowing through Wayne and Oakland Counties, with some headwaters in Washtenaw County. The Rouge River drains a 438 square mile area that includes more than 400 lakes and ponds and more than 50 miles of park land along its banks.

The entire Rouge River Basin is designated as an AOC. It flows into another AOC, the Detroit River, which eventually empties into Lake Erie. The Double Eagle Steel Coating Company is located in Dearborn, Michigan on the Lower Rouge River.

### **Background**

From Spring until August 1986, due to a design malfunction in the Double Eagle Steel Coating Company's wastewater treatment plant, levels of zinc far in excess of the company's NPDES permit were discharged into the Rouge River, including quantities of up to three tons per day. Sampling by the MDNR did not find markedly high levels of zinc in the river sediments. However, MDNR later determined that stormy weather caused scouring of the river bed and dispersed the zinc downstream.

### **Administrative History**

The case was referred to the Michigan Attorney General's Office for enforcement action. A Consent Decree was signed in October 1986. By the terms of the Consent Decree, Double Eagle Steel agreed to undertake a dredging program in the Rouge River to remove the excess zinc deposits.

### **Amount of Contaminated Sediments**

- Volume: 34,500 cubic yards
- Mass: 55,080 tons
- Highest Zinc Concentration: 2,500 ppm

### **Project Status**

Per the Consent Decree, the sediment from the company's outfall to approximately 200 yards down river was removed. This was done using mechanical dredging to a depth of 0.3 meters and across 0.25 kilometers of the Rouge River. The sediment was disposed of at the Army Corps of Engineers' Point Mouille Facility on southwestern Lake Erie. The dredging was completed in October 1987. Post-monitoring of effluents have shown no indication of renewed zinc discharge violations.

### **Total Cost**

All dredging and disposal activities had totaled approximately \$1,000,000 by the end of the project.

## **St. Marys River - Cannelton Industries**

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### **Location**

The St. Marys River is the 70-mile connecting channel between Lakes Superior and Huron. The Area of Concern extends from the head of the river at Whitefish Bay (Point Iroquois) downstream through St. Joseph Channel to Humbug Point on the Ontario side and to the outlet of Lake Munuscong at Point Aux Frenes on the Michigan side. The Cannelton Industries, Inc. Site covers 75 acres along the south bank of the St. Marys River about 1.5 miles west of the downtown area of Sault Ste. Marie, Chippewa County, Michigan.

### **Background**

Starting in 1900, the Northwestern Leather Company manufactured leather products on the site, dumping tannery wastes on 5 acres located in the 100-year flood plain of the St. Marys River. The waste was disposed of to a depth of 6 to 8 feet and left uncovered. An estimated 10,000 cubic yards were disposed of, as observed from the depth of wastes along the bank and the area void of vegetation. In 1954-1955, Fibron Limestone Co. (a subsidiary of Algoma Steel Corp., Ltd. of Canada) purchased the 75 acres. Subsequently, the property was transferred to Cannelton Industries, Inc., another Algoma subsidiary. The property was intended for construction of a manufacturing plant that was never built. Algoma dismantled various structures that were considered hazardous. The site is now idle. The Algoma Slip sediments are contaminated mostly with metals and PAHs. In addition, sediments are contaminated with various heavy metals, oil and grease, PCBs and PAHs in local areas along the Ontario shoreline, the north shore of Sagan Island, in Little Lake George and in Lake George, all downstream of Ontario point source discharges. Communities of benthic organisms are impaired along the Ontario shoreline downstream of industrial and municipal discharges.

### **Administrative History**

In 1986, Algoma Steel agreed informally with the State to construct (1) a wall along the shore of the St. Marys River to prevent wave and ice action from removing solid material from the site, and (2) an impermeable clay cap to prevent erosion and prohibit rainwater from infiltrating the site. In the spring of 1989, under a Consent Order with U.S. EPA, Algoma Steel installed a sprinkler system as a temporary measure in a 2-acre barren zone with a history of fires. In November 1989, Algoma Steel completed a wall to control erosion along the shoreline of the barren zone. The remediation efforts are now being conducted under a Superfund Emergency Removal Action. In 1992, a ROD was signed which called for the excavation and dredging of tannery waste, contaminated soils and sediments. New information collected in the pre-design studies indicated that the measures called for in the 1992 ROD are not necessary. Soil leaching has been minimized and sediment toxicity and bioaccumulation studies do not show contaminated levels high enough to threaten aquatic organisms. U.S. EPA and MDEQ have agreed that the majority of sediments can be managed in place, which will limit dredging and lower costs.

**Amount of Contaminated Sediments**

- Volume: 3,000 cubic yards of contaminated sediments, contaminated soils and tannery waste removed

**Project Status**

In February 1999 the IJC announced the findings and recommendations of its Status Assessment on remedial activities in the St. Marys AOC. The Status Assessment highlighted the leadership section of the previously-signed Four Agency Framework of Roles and Responsibilities for the Implementation of the Detroit River, St. Clair River and St. Marys River Shared Remedial Action Plans.

There have been impressive developments since the initiation of the Status Assessment and follow through with restoration goals should result in continuing progress toward restoration in the St. Marys AOC. The BPAC is working closely with Ontario's Lake Superior Programs Office to complete Stage 2 of the RAP.

The removal of 3,000 cubic yards of contaminated sediment, contaminated soils and tannery waste took place in 1999. The remainder of contaminated sediment will undergo natural attenuation.



## **Niagara River AOC: 102<sup>nd</sup> Street Embayment**

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### **Location**

This site is located along the Niagara River banks within the eastern section of the City of Niagara Falls, New York.

### **Background**

The 102<sup>nd</sup> Street Site was used as a landfill from 1943 to 1971 for approximately 159,000 tons of wastes. These wastes included organic phosphites, inorganic phosphates, HCHs, brine sludge, chemical and demolition wastes, fly ash, etc. The site is owned jointly by Olin Chemical Corporation and Occidental Chemical Corporation.

### **Administrative History**

In 1979, the U.S. Department of Justice, on behalf of the EPA, filed a law suit against the two Potentially Responsible Parties (PRPs) to end the continuing discharges and to clean up onsite and offsite contamination. The parties, with EPA and State guidance, agreed to conduct a study into the nature and extent of site contamination and to recommend alternatives for the cleanup of the site. The Canadian government has shown a special interest in the site, since it abuts the EPA/NYSDEC-lead Superfund Site. In September of 1990, a ROD was issued. The ROD encompassed containment of the landfill, including slurry wall construction, capping, removal of contaminated sediments, removal of off-site contaminated soil, storm water re-routing, and long term O&M including leachate collection, treatment and monitoring. In 1991, U.S. EPA issued an Administrative Order for the PRPs to begin implementing the cleanup.

### **Amount of Contaminated Sediments**

- Contaminants of Concern: VOCs (including benzene, toluene); semi-volatile organics (such as chlorinated benzenes, phenols and chlorophenols); pesticides; chlorinated dioxins and furans; and heavy metals (including arsenic, cadmium and mercury)
- Volume: 28,500 cubic yards
- Highest HCH Concentration: 867 ppm
- Highest 2,3,7,8-TCDD Concentration: 3.3 ppb

### **Project Status**

In 1972, the site was capped, a fence was erected on three sides, and a bulkhead along the Niagara River was installed. The PRPs, under EPA and State supervision, conducted an investigation of the site, which was completed in 1990. In September 1990, the EPA selected a remedy. An Administrative Order, covering the remedial design and remedial action, was signed by the EPA in September 1991 and issued against the two PRPs. The Remedial Design Work Plan was approved by the EPA on May 5, 1992. Pre-design filed activities extended from September 14, 1992 through October 30, 1992. The Intermediate Engineering Report (IER) was approved by the EPA in June 1995. Remedial action activity, which began in

April 1996, continued through a second construction season in 1997. The construction of the slurry wall was completed in 1996, along with excavation of contaminated sediments from the embayment. The installation of a permanent synthetic/clay cap over the landfill was completed during the 1997 construction season. In 1998, the design was modified to include pumping of the leachate from the site to the Love Canal Treatment Facility. The remedial construction activities were completed in early 1999, and the long term O&M began.

**Total Cost**

The cost of the entire remediation project, as specified in the ROD, is approximately \$30,000,000.

## **Niagara River AOC: Buffalo Color - Area D**

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### **Location**

Area D of the Buffalo Color Plant is in the City of Buffalo, New York. The site is bounded on three sides by the Buffalo River, approximately four miles upstream from the confluence of the Buffalo and Niagara Rivers.

### **Background**

Area D was used for chemical manufacturing, handling and disposal from 1905 to 1974. It was originally owned and operated by Contact Process Company and National Aniline Chemical Company. In 1920, these companies merged into Allied Chemical and Dye Corporation (now Allied Signal). Buffalo Color Corporation purchased the site in 1977 and it has remained idle since. Remedial investigations of the site have found evidence of PAHs, chlorinated benzenes and heavy metals in the site fill layer. Volatile organics, chlorinated benzenes, heavy metals and non-aqueous phase liquid have been found in the groundwater.

### **Administrative History**

This is a NYSDEC-lead site. A Consent Agreement was signed in April 1982 to undertake field investigations. Buffalo Color and Allied Signal completed the Remedial Investigation in 1989. A ROD was signed in November 1991, outlining the following actions:

- Protection of the shoreline and dredging of adjacent river sediments
- Installation of a soil bentonite slurry wall around the entire perimeter of the site.
- Collection and treatment of shallow groundwater from within the site.
- Installation of a flexible membrane liner covered with soils and vegetation.
- Creation of a wetlands area to promote aquatic and other wildlife in the area.

### **Amount of Contaminated Sediments**

- Volume: 45,000 cubic yards (estimate)
- Highest PAH Concentration: 360 ppm
- Highest Chromium Concentration: 1,990 ppm

### **Project Status**

Remediation work began in July 1996 and was completed in October 1998. Sediments were excavated with an on-shore backhoe and placed on the site, which has since been capped.

### **Total Cost**

The entire remediation project cost approximately \$8 million.

## **Niagara River: Frontier Chemical - Pendleton**

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### **Location**

The Frontier Chemical Site consists of approximately 70 acres of land adjacent to Bull Creek, which is about 4.25 miles from the Niagara River. This site is located on Townline Road in the town of Pendleton, New York.

### **Background**

From 1958 to 1974, Frontier Chemical Waste Process, Inc. used this facility to treat and dispose of chemical wastes. While in operation, the site processed various wastes including solvents, oils, acids, dyes, paint wastes, and heavy metal sludges. Quarry Lake, located on the site, was used to store discharges from these operations. Barrels containing wastes were buried underground on the site. In 1984 and 1985, over 50 barrels containing pyridine were excavated.

### **Administrative History**

Although Consent Orders were issued in 1984, 1985 and 1988, to remediate Quarry Lake, Frontier did not comply with these orders. Therefore, the New York State Department of Environmental Conservation (NYSDEC) proceeded with the cleanup under State Superfund.

The RI/FS study was completed in 1991 and determined that the bottom of Quarry Lake was contaminated with heavy metals. The remedy selected included dredging of lake sediments, containment of the process area, groundwater collection and treatment, and control of run-off. Since Frontier Chemical was no longer a viable firm, companies which shipped wastes to the site including Olin, Dow and Allied Signal were identified by the state as PRPs. The ROD was issued in march 1992, and a Consent Order requiring completion of site remediation was signed with the PRPs.

### **Amount of Contaminated Sediments**

- Volume: 56,000 cubic yards
- Highest Chromium Concentration: 1,100 ppm
- Highest Cadmium Concentration: 87 ppm

### **Project Status**

The project was completed in 1996, and long term monitoring has begun.

### **Total Cost**

The total cost of the site remediation project, including 30 year operation and maintenance estimates, is approximately \$18,770,000.

## **Niagara River AOC: Gill Creek - DuPont Site**

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### **Location**

The DuPont facility is located on Buffalo Avenue in the city of Niagara Falls, New York. It consists of 50 acres and is separated from the Niagara River by the Robert Moses Parkway. The site is transected into two halves by Gill Creek. Much of the site is built on filled land. Groundwater discharges into Gill Creek and the Falls Street Tunnel.

### **Background**

DuPont's plant has been used for chemical manufacturing since 1898. Chemicals disposed of on the site include: chloroform, methylene chloride, trichloroethylene, PCBs, and other organic and inorganic compounds.

During the Niagara River Toxics Investigation in 1982, the United States Geological Service (USGS) drilled six monitoring wells along the Robert Moses Parkway. Well samples indicated high levels of chlorinated organics in the groundwater. This groundwater had also migrated into Gill Creek, causing sediment contamination.

### **Administrative History**

Gill Creek was partially remediated in 1982 under a State Consent Order; however, contamination from both the DuPont and Olin facilities still remained. The DuPont ROD was issued in 1989.

### **Amount of Contaminated Sediments**

- Volume: 8,020 cubic yards
- Highest PCB Concentration: 11,000 ppm

### **Project Status**

The Gill Creek remediation project was a joint effort with Olin Corporation. The dredged material was disposed of offsite at a commercial disposal facility. It was completed in December 1992 and the creek has been restored. Annual monitoring of creek sediments is performed by DuPont and Olin.

### **Total Cost**

DuPont has spent \$40,000,000 for total site remediation. The Gill Creek remediation cost an estimated \$10,000,000, with a portion of that cost shared by Olin Corporation.

## **Niagara River: Gill Creek - Olin Industrial Welding Site**

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### **Location**

The site is located on Packard Road, near 30<sup>th</sup> Street, in the City of Niagara Falls, New York. The site is about 1/4 mile north of the Niagara River.

### **Background**

This site facility was used by the High Energy Fuel Division of Olin during the 1940s and early 1950s to operate a research laboratory and pilot process plant. It is a low lying area which has been filled with brine sludge (containing mercury), industrial scrap, fly-ash and possibly waste transformer oil containing PCBs. The buildings on the site have all been demolished. Contamination has been found in the groundwater, the soil, and the sediments of Gill Creek.

### **Administrative History**

Under a State Consent Order, a Remedial Investigation and Feasibility Study was completed in December 1993. In November 1994 a ROD was signed, as was an order to dredge the creek's contaminated sediments. The RI reported low levels of mercury, hexachlorocyclohexanes (HCHs) and PAHs in the sediments of Gill Creek.

### **Amount of Contaminated Sediments**

- Volume: 6,850 cubic yards
- Highest Mercury Concentration: 11 ppm

### **Project Status**

This project was completed in October 1998. The dredged material will be landfilled on site.

### **Total Cost**

Estimated sediment remediation cost for this section of Gill Creek is \$1.4 million.

## **Niagara River AOC: Bloody Run Creek - Hyde Park Landfill**

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### **Location**

The Hyde Park Landfill is a 15 acre site located less than ½ mile from the Niagara River in northwestern Niagara Falls, Niagara County, New York. The site is a few blocks east of a 500 home residential community. The drainage from the landfill formerly flowed through Bloody Run Creek, which flows north along the perimeter of a portion of the residential community and discharges into the Niagara River gorge.

### **Background**

The landfill is owned by Occidental Chemical Corporation (formerly Hooker Chemical and Plastics). Approximately 80,000 tons of hazardous materials were dumped at the site from 1953 to 1974. These materials included 2,4,5-trichlorophenol (TCP), dioxins and chlorinated organic chemicals, requiring the installation of a clay cap and shallow leachate collection system around the landfill area in 1979. Since that time, additional work has been completed including a deeper leachate collection system around the existing landfill. Monitoring data showed that surface water and groundwater along Bloody Run Creek had been contaminated by wastes leaching from this landfill. Dioxin was found in the sediment taken from Bloody Run Creek.

### **Administrative History**

This site is on the NPL and governed by a pre-CERCLA settlement agreement. On January 19, 1981, the Federal and State Governments and Occidental Chemical Corporation signed a Consent Decree. This agreement, which became effective on July 1, 1982, specified the process by which OCC would remedy the problems at the site, maintain these remedies, and ensure that they remain effective. The agreement also required a 35 year minimum period of remedial maintenance from the date of judgement. Remediation work began after the Agreement on a Requisite Remedial Technology (RRT) was approved in 1986. Numerous mitigation activities have been completed on the site under the agreement, including the excavation of Bloody Run Creek sediments.

### **Amount of Contaminated Sediments**

- Volume: 27,000 cubic yards
- Highest 2,3,7,8-TCDD Concentration: 3.5 ppb
- 

### **Project Status**

Sediment remediation on Bloody Run Creek began in October 1992 and was completed in March 1993.

### **Total Cost**

The entire remediation project (including well installation, a landfill cap, leachate treatment/storage facilities, and sediment remediation) has cost \$58,000,000. Of this total, the federal government provided \$11,000,000 and the PRP financed the remainder. It is also estimated that operation and maintenance expenditures for the PRP will be about \$2,000,000/year for 30 years.

## **Niagara River AOC: Iroquois Gas and Westwood Pharmaceutical**

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### **Location**

The Iroquois Gas and Westwood Pharmaceutical Hazardous Waste Site is located in Erie County, in the city of Buffalo, New York. The site is bounded by Dart Street on the east, Buffalo Structural Steel on the north, Scajaquada Creek on the west, and a residential area to the south. The site includes a 1600 foot long section of the Scajaquada Creek adjacent to the Westwood Plant. The creek flows into the Niagara River just north of Lake Erie.

### **Background**

This site was used for approximately the first half of the century to manufacture gas. Iroquois, which became National Fuel Gas Distribution Corporation, used the site for gas production and storage from 1925 until the 1960s. The area was sold to Westwood Pharmaceuticals, Inc. in 1972.

Westwood began to build a warehouse in the southwest corner of the property in 1985. During construction, water and soil contamination was discovered. The Remedial Investigation determined that the site soil was contaminated with PAHs, BTEX chemicals (benzene, toluene, ethylbenzene and xylene), lead and cyanide. The groundwater, which flows toward Scajaquada Creek, is contaminated with PAHs and BTEX. The RI also concluded that 7,350 gallons per day of groundwater was discharging into the creek and the estimated amount of non-aqueous phase liquids entering the creek was 440 pounds/year. The creek sediments were found contaminated with the same pollutants as found in the soil and groundwater at the site.

### **Administrative History**

Under the Federal Court Consent Decree, the RI was completed in June 1993. In March of 1994, NYSDEC issued a ROD that described the remedial actions. In addition to the remediation of the land-based site, the ROD also outlined a plan to excavate the contaminated sediments in Scajaquada Creek and to restore the creek channel to background conditions.

### **Amount of Contaminated Sediments**

- Contaminants of Concern: PAH and BTEX
- Volume: 17,500 cubic yards
- Highest PAH Concentration: 19,600 ppm

### **Project Status**

The main plant area was completed in September 1997. The creek remediation was completed in March 1999. For the remediation process, Westwood is responsible for the main plant area and National Fuel Gas Distribution Corporation is responsible for Scajaquada Creek.

### **Total Cost**

The entire remediation project cost is approximately \$8 million for both parties.



## **Niagara River AOC: Black and Bergholtz Creeks - Love Canal**

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### **Location**

Love Canal is a 16-acre landfill in the southeast corner of the city of Niagara Falls, New York, about 0.3 miles north of the Niagara River.

### **Background**

In the 1890s, a canal was excavated to provide hydroelectric power. However, the project was not completed, and the canal was later used by Hooker Electrochemical for disposal of over 21,000 tons of various chemical wastes, including dioxins. Dumping ceased in 1952, and in 1953 the disposal area was covered and deeded to the Niagara Falls Board of Education. Extensive development occurred near the site, including construction of an elementary school and numerous homes.

First reported at the site during the 1960s, problems with odors and residues increased in the 1970s as the water table rose, bringing contaminated groundwater to the surface. Studies indicated that numerous toxic chemicals migrated into surrounding areas. Runoff from the Love Canal area drains into the Niagara River at a point 2.8 miles upstream of the intake tunnels for Niagara Falls' water treatment plant, which served about 77,000 people at the time. The river sediment had also become contaminated at the discharge point.

From 1983, investigations were conducted in order to assess the extent of the contamination in local waterways including Black, Bergholtz and Cayuga Creeks, and the Niagara River 102<sup>nd</sup> Street Delta.

### **Administrative History**

Love Canal is a Superfund Site on the National Priorities List (NPL). The PRP involved with the site is Occidental Chemical Corporation (formerly known as Hooker Chemical and Plastics).

### **Amount of Contaminated Sediments**

- Volume: 17,200 cubic yards
- Highest 2,3,7,8-TCDD Concentration: 45.8 ppb

### **Project Status**

The sediment remediation was completed in 1990, after sediment was excavated from the Black and Bergholtz Creeks and stored at Occidental Chemical's Buffalo Avenue Plant. Occidental will incinerate a portion of the wastes and dispose of the rest at a RCRA landfill. No remedial action was found necessary in Cayuga Creek and the 102<sup>nd</sup> Street delta has been remediated through a separate project (see 102<sup>nd</sup> Street Embayment).

Since 1979, the following remedial work has been completed: clay cap installed, perimeter leachate collection system and activated carbon treatment plant constructed, cap extended incorporating synthetic membrane, offsite sewers cleaned and Black and Bergholtz Creeks cleaned.

**Total Cost**

Between 1977 and 1980, New York State and the Federal government spent about \$45 million at the site: \$30 million for relocation of residents and health testing, \$11 million for environmental studies, and \$4 million for a demonstration grant (under the Resource Conservation and Recovery Act) to build a leachate collection and treatment system.

In accordance with settlement agreements reached with New York and the federal government, Occidental paid the state \$98 million and the federal government \$129 million. Occidental also took over operation and maintenance of the collection and treatment system.

The sediment remediation of the Black and Bergholtz Creeks cost an estimated \$14 million.

## **Niagara River AOC: Niagara Mohawk - Cherry Farm/River Road Sites**

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### **Location**

This site is located in Erie County within the town of Tonawanda, New York. It is an 80-acre area between River Road and the Niagara River.

### **Background**

The Cherry Farm and River Road Sites were used for the disposal of waste from steel manufacturing from 1908 to 1963, and were operated as a disposal landfill for industrial waste from facilities in the area from 1963 to 1970. Flyash, foundry sand, sludge, liquid boiler cleaning wastes, concrete rubble and other fill were disposed on these sites.

### **Administrative History**

Under the State Superfund process, a Consent Order was signed by a PRP group in April 1988. The Records of Decision for the Cherry Farm and River Road Sites were signed on February 15, 1991 and March 24, 1994 respectively. An amended ROD for the Cherry Farm Site was issued on October 7, 1993 that recognized the similarities between the Cherry Farm and River Road Sites. A joint Order on Consent was signed on September 27, 1994 by the parties responsible for the site (PRPs) that led to the design and implementation of the remedial program. In 1996, the project was expanded to include the removal of contaminated sediments.

### **Amount of Contaminated Sediments**

- Volume: 42,000 cubic yards removed

### **Project Status**

The sediment removal project phase was completed in November 1998. The Cherry Farm/River Road remedial project was completed in August 1999. Construction certification, as-built drawings and Operation Maintenance and Monitoring Plan were prepared in October 1999. The site is now entering the operation and maintenance phase. Future plans for the Cherry Farm portion of the site include the potential development of a State Park.

### **Total Cost**

The project cost estimate is about \$8,000,000 for the remediation land based work and about \$3,000,000 for the sediment removal phase on the Cherry Farm/River Road Sites.

## **Niagara River AOC: Niagara Transformer**

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### **Location**

The site is located at 1747 Dale Road in the city of Cheektowaga, Erie County, New York. The drainage ditches at the site flow into the Sloan Sewer Drain. This drain emerges to the surface and travels through a residential district before it eventually discharges into the Buffalo River.

### **Background**

Owned and operated by the Niagara Transformer Corporation, this site houses a facility that manufactures electrical transformers. From 1958 until the late 1970s, transformer oil wastes containing PCBs were discharged on site in order to control dust in the parking lot and kill weeds.

In April of 1990, an oily leachate in one of Niagara Transformer's drainage ditches was found to contain approximately 80,000 ppm PCBs. High levels of PCBs were also detected in the sediments downstream in the drainage system. In the residential area, stream sediments were found to have PCB contamination in the range of 1-30 ppm.

### **Administrative History**

Under the State Superfund process, Niagara Transformer agreed to complete a RI/FS. The RI Report found that PCB contamination had migrated into the perimeter drainage ditch. Elevated PCB levels were also discovered in the surface soil on a cemetery adjacent to the site. On December 30, 1993, a ROD was signed which called for excavation and off-site disposal of the drainage ditch sediments.

### **Amount of Contaminated Sediments**

- Volume: 11,500 cubic yards
- Highest PCB Concentration: 3,200 ppm

### **Project Status**

Remediation efforts are complete.

### **Total Cost**

The total remediation project cost approximately \$5,600,000.

## **Niagara River AOC: Pettit Flume - Durez-Occidental**

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### **Location**

This plant site is owned by Occidental Chemical Corporation (formerly Hooker Chemical and Plastics). It is on Walck Road in the city of North Tonawanda, Niagara County, New York. The area borders residential and light commercial properties on three sides. The fourth side is adjacent to another manufacturing company which discharges to the Niagara River.

### **Background**

The chemical plant located here disposed of its wastes on site, including phenol tar and phenol bearing material. Contaminants from the site migrated via the storm sewer system, and they contaminated sediments at the Pettit Flume outfall area.

### **Administrative History**

This site was remediated under a State Consent Order. The selected remedy included containment of the plant site, cleaning of the storm sewers and contaminated sediment excavation from the storm sewer outfall area. These sediments were sent to Occidental's Niagara Falls plant for storage pending final disposal.

### **Amount of Contaminated Sediments**

- Volume: 15,070 cubic yards
- Highest 2,3,7,8-TCDD Concentration: 15 ppb

### **Project Status**

The remediation project began in 1989 and was completed in 1995. In the Pettit Storm Sewer Outfall area, the contaminated sediments were dredged. By April 1996, final site restoration was completed.

### **Total Cost**

The entire project cost approximately \$23,000,000.

## **Niagara River AOC: Union Road**

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### **Location**

The site is located on Losson Road in the city of Cheektowaga, Erie County, New York.

### **Background**

Prior to 1955, the area was used as a railroad maintenance and classification yard by the New York Central Railroad. Coal ash, grease and oil from locomotive and rail car maintenance were frequently dumped into a marshy pit on site. The existence of the pit was not brought to the attention of state and county environmental agencies until the early 1980s, when it was discovered that some of the wastes had migrated into nearby Deer Lik and Slate Bottom Creeks. Tar samples taken from the pit indicated a leachable lead concentration of 130 ppm.

### **Administrative History**

The remediation project is under State Superfund authority, which completed the RI/FS in the summer of 1991. A ROD was signed in March of 1992. The ROD required the following: waste containment with a subsurface barrier and cap, extraction and groundwater treatment, excavation of soils and sediments in select areas, and covering these areas with clean fill and vegetation.

### **Amount of Contaminated Sediments**

- Volume: 5,600 cubic yards
- Highest Lead Concentration: 84,900 ppm

### **Project Status**

The remediation project was completed in 1996.

### **Total Cost**

The remediation work for the entire site cost about \$8,000,000.

## **St. Lawrence River - ALCOA Site**

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### **Location**

The Aluminum Company of America (ALCOA) facility is located on 2,800 acres of land within the Town of Massena, New York. The facility is adjacent to the St. Lawrence River to the north, the town of Massena and a power canal to the west, and the Grasse River to the South. This site is part of the St. Lawrence-Massena AOC.

### **Background**

ALCOA has used this site since 1903 for the production of aluminum. From the late 1950s until the early 1970s, PCBs were used in the facility's hydraulic fluids and electrical equipment. The smelting process also created a waste by-product, spent potliner, which is a listed hazardous waste. Consequently, waste PCBs, potliner, and other hazardous wastes were generated and disposed of at the site.

### **Administrative History**

U.S. EPA issued an Administrative Order under Superfund in 1989 to ALCOA for study and remediation of the St. Lawrence River and the Grasse River sediment. ALCOA is responsible for 8.5 miles of the Grasse River before it joins the St. Lawrence River.

Although this site is not on the National Priorities List, U.S. EPA is responsible for the cleanup of the Grasse River portion of the contamination. NYSDEC is the lead agency on the soil remediation. ALCOA began sediment remediation in 1995. At that time, they excavated approximately 3,500 cubic yards of sediment from a hotspot on the Grasse River near their facility during a demonstration project. However, there is still an unknown amount of contaminated sediment left in the river.

### **Amount of Contaminated Sediments**

- Volume Dredged: 3,500 cubic yards
- Volume Remaining: Unknown
- Highest PCB Concentration: 72 ppm

### **Project Status**

The site is still in the Analysis of Alternative stage. Current studies are investigating the feasibility of dredging approximately 8.5 miles of the Grasse River.

### **Total Cost**

The 1995 Grasse River remediation effort cost \$4,800,000. No estimate for the future remediation work is available at this time.

## **St. Lawrence River - General Motors Site**

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### **Location**

The General Motors (Central Foundry Division) Site is a 165 acre aluminum casting facility on the St. Lawrence River, in Massena, St. Lawrence County, New York. It is part of the Massena AOC. The site is near the St. Lawrence River, Raquette River and the St. Regis Mohawk Nation at Akwaesasne.

### **Background**

The site contains two areas that have received an estimated 30,000 cubic yards of PCB-contaminated sludges generated from hydraulic oil used in the plant's machinery from 1959 until 1973. Several areas on the property are contaminated, including the industrial landfill and east disposal site. Analyses during the RI indicate that groundwater and surface water are contaminated on the site. PCB contamination has been detected in the sediments of both the Raquette and St. Lawrence Rivers and a cove attached to the Mohawk reservation.

### **Administrative History**

This project is administered under Superfund and is on the National Priorities List. U.S. EPA issued a ROD in 1990 requiring a \$78 million cleanup of the site, except for two areas which were covered in a second 1992 ROD. These RODs outlined remediation activities including a combination of excavation, sediment removal and treatment to remove chemicals such as PCBs.

In 1995, GM dredged 13,800 cubic yards of sediments from the St. Lawrence River. The dredging goal was to restore the sediments to 1 ppm PCBs, however this goal was not met. An average of 3 ppm PCBs still remain in the river sediments, with one sample measuring 6,000 ppm PCBs. Hot spots remaining in the dredged area were capped.

### **Amount of Contaminated Sediments**

- Volume Dredged: 13,800 cubic yards dredged in 1995
- Volume Remaining: Unknown
- Highest PCB Concentration: 6,000 ppm (in the sediment still remaining after the 1995 dredging)

### **Project Status**

Dredging of sediments in Raquette River is expected to occur in September 2000.

### **Total Cost**

The 1995 dredging cost approximately \$7,000,000. The total estimated cost for the entire project is \$78,000,000.



## **Black River - USS/Kobe Steel Company**

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### **Location**

The USS/Kobe Steel Company (formerly USS Lorain) is located in Lorain, Ohio on the banks of the Black River, an IJC Area of Concern. Discharges from this facility have contributed to the degradation of the Black River.

### **Background**

Sampling conducted during the 1970s and 1980s by U.S. EPA and Ohio Environmental Protection Agency (OEPA) indicated significant sediment contamination. The river was identified as having the high concentrations of steelmaking coke plant wastes commonly referred to as polynuclear aromatic hydrocarbons (PAHs). PAHs are of concern because they have been shown to produce tumors and lesions in benthic fish populations. Sediment sampling took place on the river and high concentrations of PAHs were found at levels as high as 390 ppm. Cadmium was also found at levels exceeding 30 ppm and studies found tumors in Black River fish.

### **Administrative History**

In January 1979, a civil action was brought against USS by the U.S. EPA. The action claimed that USS was in violation of the terms of its NPDES permit issued pursuant to the CWA. Negotiations were entered into and led to a Consent Decree issued in June 1980.

By the terms of this Consent Decree, USS agreed to pay a \$4 million penalty. Of this amount, \$1.5 million was to be spent on a dust suppression program at the facility. Because of operation closures at the Lorain Plant, USS did not spend \$1.5 million on dust suppression.

In order to resolve the outstanding \$1.5 million expenditure, USS and the U.S. EPA entered into negotiations which resulted in the 1985 agreement which required USS to remove and dispose of 50,000 cubic yards of sediments from the Black River.

### **Amount of Contaminated Sediments**

- Volume: 50,000 cubic yards
- Highest PAH Concentration: 390 ppm

### **Project Status**

The remediation is complete. Dredging of the river was initiated in the fall of 1989. Due to delays from bad weather conditions and mechanical failures, however, the project fell behind schedule. Over 50,000 cubic yards of contaminated sediment along a 0.8 river mile stretch were finally removed during the summer and fall of 1990. The contaminated sediment was removed and placed in an on-site TSCA certified landfill.

### **Total Cost**

The sediment remediation project cost \$1.5 million, and was funded entirely by the PRP.

### **Post-Remediation Sampling**

A number of post-remediation studies have been conducted on the Black River, the most recent by the USGS. As part of this study sediment sampling was conducted in the fall of 1997, and fish samples were collected in the spring of 1998. The results of this study indicate that PAH levels in both sediment and fish have declined since the early 1980s. The results of a fish study conducted two and three years after the dredging of the Black River showed a high prevalence of tumors in fish, which indicated that these fish were adversely affected by PAH-contaminated sediments which they were exposed to during the 1989-1990 dredging which had previously been buried. However, the results of the 1998 fish study in the Black River, eight years after the dredging took place, show that liver cancers are at their lowest documented levels, and that the percentage of fish with normal healthy livers is almost 70%, as opposed to 20% in the early 1980s. The results of this study indicate that both the closure of the coke plant and the remedial dredging of the contaminated river, although initially exposing fish to previously buried contaminated sediments, had beneficial results on the Black River.

## **Maumee River AOC: Unnamed Tributary to Ottawa River**

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### **Location**

The Ottawa River Unnamed Tributary flows north to the Ottawa River in the city of Toledo, Ohio. The tributary is located upstream near the Stickney Avenue and Dura Landfills and is across the river from the Tyler Street Landfill. The GenCorp facility was sited approximately 1,000 feet to the east of the tributary.

### **Background**

GenCorp utilized this 40 acre site for manufacturing plastic coated fabrics such as vinyl upholstery. From 1967 to 1972 PCB-containing oil was used in their manufacturing process as an internal heat exchange fluid. The property was sold to Textileather Corp. in 1990.

### **Administrative History**

A Consent Agreement was signed between GenCorp and Ohio EPA in March of 1992, which called for only land based remediation. However, further studies, in 1988 and 1994, indicated elevated PCB levels in tributary sediments. GenCorp agreed to conduct further remediation studies of the sediments, although it was not the only PRP involved. This site has been remediated under a voluntary partnership with GenCorp, Ohio EPA, the City of Toledo and U.S. EPA Great Lakes National Program Office (GLNPO). Due to the cost and implementability issues, and the relatively small volume of contaminated sediment, the only disposal option considered was disposing sediments in a chemical waste landfill permitted to accept PCB-containing materials greater than 50 ppm under the Toxic Substances Control Act (TSCA).

### **Amount of Contaminated Sediments**

- Volume: 8,000 cubic yards removed
- Mass: 56,000 pounds PCBs removed

### **Project Status**

The remediation of the Unnamed Tributary to the Ottawa River was completed in June 1998, achieving a cleanup of 5-10 ppm residual PCBs.

### **Total Cost**

The total cost for the project was approximately \$5 million. This cost included conductance of the site investigation and remedial option evaluation activities, site remediation and restoration, and treatment/disposal of approximately 16,000 tons of soil/sediment and 1 million gallons of water.

## **Fox River - Deposit 56/57**

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### **Location**

Sediment Management Unit (SMU) 56/57 is located along the Fox River near the Green Bay, in between the cities of Green Bay and DePere, Wisconsin.

### **Background**

The SMU 56/57 demonstration project is a collaborative project between the State of Wisconsin and the Fox River Group (FRG), with funding provided by the FRG. The FRG is composed of seven paper companies who are, or were, located along the Fox River and are participating in the design and implementation of the project.

The Lower Fox River, from Lake Winnebago to Green Bay, is the largest tributary to Lake Michigan located in Wisconsin. The Fox River Valley has been an area of substantial growth and development. Over time, this growth has resulted in impacts to the aquatic environment from industrial, municipal, and other discharges to the river. Since the 1970s, stricter laws and regulations have resulted in significant improvements to the Fox River's water quality.

However, PCBs are still present in the river sediment. In 1988 a study was conducted to determine the sources and quantities of PCBs in the Lower Fox River. The study determined that the river sediment contributes a significant amount of PCBs to the river water. Thirty-five sediment deposits, containing an estimated 8,800 pounds of PCBs, were identified in the 32 miles of river upstream of the DePere dam. Another PCB mass was identified in the seven miles of river downstream of the DePere dam containing between 44,000 and 88,000 pounds of PCBs.

### **Administrative History**

From 1991 through 1995 the Wisconsin Department of Natural Resources (WDNR) and the U.S. Environmental Protection Agency (EPA) conducted several follow-up studies. These studies indicated that PCB concentrations in the sediments in an area near the Fort James Turning Basin were the highest in the river. Because of the high PCB concentrations, this area, named SMU 56/57, was selected for a demonstration project to evaluate full-scale sediment removal and disposal from the Lower Fox River.

By a 1997 agreement with the State of Wisconsin, the Fox River Group of companies (Appleton Papers Inc., Fort James Corporation, NCR Corporation, P.H. Glatfelter Company, Riverside Paper Corporation, U.S. Paper Mills Corp., and Wisconsin Tissue Mills Inc.) agreed to provide up to \$8 million for the design, implementation, and monitoring of a sediment restoration project below the DePere dam. The demonstration project was to be designed to provide important information regarding large-scale sediment restoration projects in the Lower Fox River.

**Amount of Contaminated Sediment**

- Contaminants of Concern: PCBs, some mercury
- Highest PCB Concentration: 710 ppm
- Average PCB Concentration: 54 ppm
- Sediment Volume: 116,000 cubic yards
- Mass PCBs: 4,600 pounds
- Sediment Removal (1999): approximately 30,000 of 80,000 planned cubic yards removed

**Project Status**

Dredging was completed in December 1999. The SMU 56/57 demonstration project included hydraulic dredging of contaminated sediment, on-shore dewatering (removing water from the sediment), water treatment, and the transportation and disposal of PCB-contaminated sediments. The original volume target for contaminated sediment removal from 56/57 was 80,000 cubic yards; 30,000 cubic yards were removed in 1999. The sediments were landfilled in the Fort James Landfill at Green Bay. A separate cell has been constructed to contain this sediment separate from the other material disposed of at this site. The cell was designed and constructed utilizing the current engineering standards for landfill design in Wisconsin and includes a collection system to collect any leachate and treat it.

An Administrative Order on Consent has been signed with the Fort James Corporation to continue dredging SMU 56/57 this year. During the first phase of this dredging, the Fort James Corporation will concentrate on the material that is left over from last year's dredging project. During Phase II, they will remove material that is as of yet undisturbed. The Fort James Corporation has submitted its plans to begin dredging in August 2000. The dredging target is 1 ppm PCB. In locations where this 1 ppm target is met, no further action will be taken. A six inch sand layer will be placed in locations where concentration reductions can only be achieved to below 10 ppm. Dredging is expected to be completed by the end of October 2000. The sand layer is expected to be placed in necessary locations by mid-November 2000.

**Total Cost**

Final costs have not yet been calculated.

## **Fox River - Deposit N**

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### **Location**

Sediment Deposit N is located on the Fox River near the Village of Kimberly, just upstream of the Cedars Dam in Wisconsin.

### **Background**

The Lower Fox River, flowing from Lake Winnebago to Green Bay, has been impacted by the presence of sediment-bound contaminants which are causing exceedences of state water quality standards. The Wisconsin Department of Natural Resources (WDNR) has determined that the principal sources of contaminants are from sediment in the river which has accumulated organic and inorganic contaminants. From a human health and ecological risk perspective, the principal contaminants of concern are polychlorinated biphenyls (PCBs) and mercury. Sampling has confirmed that sediment-associated PCBs and mercury are bioaccumulating in the aquatic food chain, causing exceedences of water quality standards, and are actively being transported within the river to Green Bay and Lake Michigan.

### **Administrative History**

Sediment Deposit N was identified by the WDNR as a priority deposit for a demonstration sediment removal project. A site Remedial Investigation was completed for Deposit N in November 1996 and a Feasibility Study was completed in April 1997. The Remedial Investigation characterized Deposit N as an area approximately 3 acres in size.

### **Amount of Contaminated Sediment**

- Average PCB concentration: 45 ppm
- Water depths: 8 feet deep (average)
- Sediment Thickness: 2 feet (average)
- PCB Mass: Approximately 142 pounds of PCBs
- Sediment Volume: estimated 11,000 cubic yards of impacted sediment
- Removal: 7,200 cubic yards removed at Deposit N
  - Additional 1,000 cubic yards removed across river at Deposit O
  - 111 pounds of PCBs removed (79% of PCB mass)
- Contractor met construction specifications for removal
  - 3" residual on bedrock for west portion
  - 6" residual on bedrock for east portion

**Project Status**

Dredging was completed in October 1999. Sediment was removed by hydraulic dredging, minimizing resuspension and off-site loss of sediment, PCBs and other constituents to the river. Efforts were focused on removing as much PCB-contaminated sediment from the deposit as was practicable within the confines of the project budget and site limitations. The project met the goal to demonstrate that modern environmental dredging can be used to remove PCB-contaminated sediment without harm to the river. The project met all permit conditions, and the removal contractor met removal specifications.

**Total Cost**

Preliminary estimate was \$4 million.

## **Menominee River - Ansul Incorporated**

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### **Location**

The Menominee River AOC is centered in the lower end of the river where it enters the waters of Green Bay, approximately 50 miles north of the city of Green Bay, Wisconsin. It includes the lower three miles of the river from the Upper Scott Paper Company dam to the river's mouth and approximately three miles north and south of the mouth along the adjacent shoreline of Green Bay. It also includes Green Island, which is located in Wisconsin waters approximately five miles southeast of the river mouth. The Menominee River forms the boundary between the northeast corner of Wisconsin and the southern tip of the Upper Peninsula of Michigan. The twin cities of Marinette, Wisconsin and Menominee, Michigan are adjacent to the AOC.

The Ansul facility is located at One Staton Street, Marinette, Marinette County, Wisconsin. Marinette County is in the northeastern part of the state, adjacent to the Menominee River. The river empties into Green Bay approximately 1.2 miles downstream of the Ansul Site.

### **Background**

Pollutants such as mercury, PCBs, oil and grease, etc., have resulted in impaired beneficial uses in the Menominee River AOC. However, one of the primary reasons the Menominee River is classified as an AOC is because of the arsenic contamination in the turning basin and in sediments along the right bank of the river below the Ansul Fire Protection Company, which is located on the Wisconsin side of the river.

Since 1934, the Ansul facility has been the site of fire suppressant products manufacturing. From 1957-1977, Ansul also produced agricultural herbicides. Manufacturing of these herbicides produced a salt by-product that was 2% arsenic by weight and stored in uncovered, unlined waste piles. An arsenic recovery plant was built to recycle waste in 1966, but was abandoned in 1967 due to uneconomical recovery. These salt piles were covered in 1973. By 1977, approximately 95,000 tons of arsenic salt were stored in three locations at the Ansul plant: the salt vault, Building 59 and the dock waste pile.

The Wisconsin Department of Natural Resources became involved with the arsenic-contaminated salt in 1971, and Ansul transported arsenic salt wastes off site. No exposed salts were present at the site after 1978. WDNR issued a Consent Order to Ansul in 1973. The Consent Order had three main provisions: to study groundwater conditions, treatment and restoration technologies, and the environmental effects of arsenic discharges to the Menominee River; to implement a long term plan for handling and disposing of arsenic salt; and to install a groundwater control trench and groundwater treatment system. After treatment



of 16 million gallons of groundwater from 1981 through 1986, Ansul petitioned the WDNR to discontinue groundwater extraction and treatment based on technical, economic, and environmental factors. The WDNR agreed in July 1986 that no further restoration activities were required under the Consent Order, and approved a long term groundwater monitoring plan. However, quarterly groundwater sampling activities were terminated and existing wells at the site were abandoned in September 1996 due to poor condition of the wells.

A Consent Order was signed between Ansul, U.S. EPA and WDNR on September 28, 1990. This Order obligated Ansul to conduct Corrective Action activities at the Facility, consisting of a RCRA Facility Investigation, Corrective Measures Study and Interim Measures. An additional work provision of the Consent Order required the facility to remove arsenic-contaminated sediments from an adjacent former boat slip by February 1998. This agreement was modified by mutual consent, and a new Interim Measures agreement was signed in September 1998. This agreement required construction of a barrier to prevent migration of highly contaminated groundwater from the facility to the Menominee River, dredging of contaminated sediments in the boat slip, and further investigation and remediation of contaminated sediments and subsoils in the Turning Basin.

A portion of the on-site RFI has been completed, however additional work will be conducted simultaneously with the river and turning basin investigation.

#### **Administrative History**

The Federal Resource Conservation and Recovery Act (RCRA) Consent Agreement between Ansul Fire Protection Company, the State of Wisconsin and the U.S. Environmental Protection Agency (U.S. EPA) was initiated in 1990. During the following seven years, Ansul was evaluating old monitoring wells in preparation for the agreement. A total of 15 damaged monitoring wells were closed. On July 1, 1997, U.S. EPA ordered Ansul to remove as much as 15,000 yards of contaminated sediment from a boat slip located adjacent to its facility. The sediment contained levels as high as 22,000 ppm arsenic.

A RCRA 3008(h) Consent Agreement was issued September 28, 1990; and an Interim Measures Agreement was signed September 28, 1998.

#### **Amount of Contaminated Sediments**

- Volume: 13,000 cubic yards removed

#### **Project Status**

The groundwater barrier construction was completed in December 1998, and consists of a steel sheet pile barrier and slurry wall system. The effectiveness of the barrier will be evaluated using a monitoring well network around the enclosed area. The contaminated sediments in the adjacent boat slip were removed by dredging between June 1999 and December 1999. 13,000 cubic yards of contaminated sediment were removed in 1999. A workplan to further investigate the nature and extent of sediment contamination, and risks to human health and the environment was submitted to the Agencies and is currently under review.

A workplan for further investigation of the Menominee River Turning Basin and a Screening Risk Assessment was submitted to the U.S. EPA in March 1999. This workplan is under review by the Agencies and has not been approved. A RCRA Facility Investigation is still underway to determine the nature and extent of contamination site-wide.

- RFI scheduled to be completed in Spring 2001
- Interim Measures scheduled to be completed Winter 2002
- Final Corrective Measures Implementation to be determined

**Total Cost**

Approximately \$5 million to date, probably \$10 million total.

## **Milwaukee Estuary AOC: North Avenue Dam of Milwaukee River**

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### **Location**

The North Avenue Dam is located on the Milwaukee River, approximately 3.2 miles upstream from the river's confluence with Lake Michigan.

### **Background**

The North Avenue Dam was constructed over 150 years ago and creates an artificial boundary between the 80-acre Milwaukee River Impoundment and the Milwaukee River Estuary. The impoundment sediments are contaminated with PCBs, PAHs, heavy metals and oxygen-demanding substances.

### **Administrative History**

This comprehensive remediation and habitat restoration project was a voluntary action funded by the state, city of Milwaukee and U.S. EPA. Easements were provided by up to 15 landowners at no cost. The project design had input from the Milwaukee County Department of Parks, Recreation and Culture, the WdnR, the City of Milwaukee, the Southeastern Wisconsin Regional Planning Commission, the Milwaukee Metropolitan Sewerage District, and the Village of Shorewood. Beginning in 1990 and continuing to the present, frequent informational meetings were also held for elected officials and the public.

The decision to cooperate and implement was based on a desire to restore the environment and provide new and enhanced recreating opportunities for the most densely populated area in the state. The City of Milwaukee has invested millions of dollars in constructing public riverwalks along the Milwaukee River Estuary and would like to see the remediation efforts improve the quality of the river.

### **Amount of Contaminated Sediments**

- Volume: 8,000 cubic yards removed  
742,000 cubic yards to be managed in place

### **Project Status**

Work Plan of this site is completed. Dam abandonment and mechanical dredging of 8,000 cubic yards of contaminated sediment were completed in 1997. Fish habitat restoration, stream bank protection (combination of rip rap, articulated concrete matting and bioengineered systems), upland plantings and wetland restoration took place in 1998. The 742,000 cubic yards of contaminated sediments which remain will be managed in place.

### **Total Cost**

- Dam abandonment: \$374,000
- Water intake replacement: \$1,700,000
- Sediment management and habitat restoration activities: \$2,600,000
- Approximate total: \$4,700,000

## **Milwaukee Estuary AOC: Ruck Pond**

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### **Location**

Ruck Pond, part of the Cedar Creek watershed, is located in Cedarburg, Wisconsin, approximately 25 miles north of Milwaukee. Cedar Creek has a series of five small millponds and dams. Four out of the five impoundments have been impacted by PCB-contaminated sediments. Ruck Pond is the farthest upstream contaminated impoundment in the Cedar Creek system.

### **Background**

As Cedar Creek travels through Cedarburg, Wisconsin, its waters are exposed to sediments contaminated by PCBs, a class of chemicals known for its carcinogenic, teratogenic, and mutagenic properties. Within the Cedar Creek system, Ruck Pond contained 80 to 85% of the PCB mass, as well as the highest concentration of PCBs. Ruck Pond is also the farthest upstream contaminated pond in the system. Therefore, it was selected as the priority impoundment for remediation.

### **Administrative History**

An emergency removal action agreement was signed with Mercury Marine, as a result of a Wisconsin Department of Natural Resources (WDNR) enforcement action.

### **Amount of Contaminated Sediments**

- Volume: 5,900 cubic meters (7,700 cubic yards)
- Mass: 355 kilograms of PCBs
- Highest PCB Concentration: 150,000 ppm
- Average PCB Concentration: 474 ppm

### **Project Status**

The area was remediated by dry excavation of the contaminated sediments. It was dammed off, and the sediment was allowed to dry to a mud consistency. The contaminated sediment was then removed and landfilled. The TSCA material was sent to a chemical waste landfill in Utah, and the non-TSCA material was landfilled at a Wisconsin facility.

The project was completed during the Fall of 1994, with 96% of the PCB mass removed. According to the Wisconsin Department of Natural Resources, there has been no evidence of any reoccurring contamination at the site. Fish tissue PCB concentrations dropped 85% (caged minnows 37 day exposure) after remediation. Long term water column PCB concentrations are projected to have decreased by 94% as a result of the cleanup. Negotiations are continuing for additional sediment remediation downstream.

### **Total Cost**

The sediment remediation cost was approximately \$1,200 per cubic meter, or \$7,080,000.

## **UPCOMING PROJECTS AT AREAS OF CONCERN**

### **Deer Lake**

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#### **Location**

Deer Lake is a 906 acre impoundment in central Marquette County near Ishpeming, Michigan. The Area of Concern (AOC) includes the Carp River watershed, including Carp Creek, Deer Lake, and the Carp River downstream about twenty miles into Lake Superior in Marquette.

#### **Background**

Mercury used in ore assays was discharged to sewers in Ishpeming by mining laboratories for about 50 years, ending in 1981. This heavy metal passed through the old wastewater treatment plants, contaminating sediments and water in the AOC. In addition, mercury was used to recover gold from a mine in the Deer Lake watershed in the 1890s. The mercury-contaminated tailings from this operation are found upland, in wetlands adjacent to the lake as well as in the lake itself. Nutrient loadings from the Ishpeming wastewater treatment plant accelerated eutrophication (enrichment) of the lake. The treatment plant was updated in 1985, but the lake remains highly productive. Deer Lake continues to recover from effects of past municipal and industrial discharges. Water quality conditions have greatly improved, but elevated levels of mercury in fish are still a problem.

In 1981, fish in Deer Lake were discovered to contain mercury in concentrations exceeding the Michigan Department of Public Health (MDPH) fish consumption level of 0.5 mg/kg and the U.S. Food and Drug Administration consumption advisory level of 1.0 mg/kg. Mercury from historic and recent mining practices, including mercury used in iron ore assays and to recover gold from crushed ore was discharged to the Deer Lake watershed. This resulted in contaminated sediments, fish and water in the AOC. Other potential sources of mercury to Deer Lake fish include atmospheric deposition and local bedrock. Remediation, including draw down of Deer Lake, was implemented from 1984-1986. Mercury levels in fish initially

increased, and then decreased until 1995. Thereafter, mercury levels in fish leveled off or again increased. The concentration of mercury in Deer Lake fish presently varies from less than the 0.5 mg/kg MDPH fish consumption advisory level to above 1.5 mg/kg. The higher concentrations tend to be in larger, older Northern Pike.

### **Administrative History**

A 1987 Remedial Action Plan (RAP) was written by Michigan Department of Natural Resources (MDNR), now the Michigan Department of Environmental Quality (MDEQ). This RAP described problems known at the time and identified actions and studies needed to further define and remediate those problems. However, the RAP was written before the 1987 amendments to the Great Lakes Water Quality Agreement (GLWQA), which outlined new guidelines for RAPs including the identification of potential beneficial use impairments. The primary impaired uses in the AOC are restrictions on fish consumption and impaired wildlife, both believed due to contaminated sediments. Although the lake is still eutrophic, Secchi disk readings continue to improve.

#### *RAP Milestones*

- 1981: Fish consumption and health advisories were issued by Michigan Department of Community Health.
- 1984-1987: Remediation plan implemented including lake draw down.
- 1985: Listed as an AOC.
- 1987: Deer Lake Remedial Action Plan written by the MDNR.
- 1987-2003: Studies by the CCIC and MDEQ concerning mercury concentrations in fish, sources, effects, and remediation options vs. likely impact on the Carp River Watershed.
- 1997: Deer Lake Area of Concern Public Advisory Council was formed, bylaws adopted, officers elected, and committees assigned for beneficial use impairment identification.
- 1999&1998: Beaver dam removal by private citizens with Boy Scouts and PAC involvement.
- 1999&1998: Stream and lake monitoring with public schools and PAC.
- 1999&1998: Lakeshore and island cleanups.
- 1999: Fish advisory and mercury cautionary signage designed, installed and maintained.

### **Project Status**

A primary goal is to identify and restore beneficial uses of the Carp River watershed that led to the lake's designation as an AOC. Goals of the PAC include addressing the 14 potential Beneficial Use Impairments, revision of the RAP, restoration of impaired beneficial uses and promotion of best management practices for the entire watershed through identification and communication. Signage maintenance around the lake will continue along with continued special projects and educational outreach.

Deer Lake sediments and fish are contaminated with mercury. A mitigation plan was implemented by CCIC in 1984, but predator fish in Deer Lake continue to show statistically higher levels of Hg in tissue than in similar nearby lakes. The State is currently working with CCIC to develop and assess data to determine whether additional mitigation is appropriate. MDEQ expects to make a decision by the spring of 2001. The Clean Michigan Initiative (CMI) bond included Deer Lake as a potential site for sediment remediation.

The state and CCIC are concurrently conducting studies within the AOC to help identify and define the problems and solutions related to contaminated sediments. The PAC has and will continue to monitor water quality data related to eutrophication. Non-point source problem areas will also be identified within the watershed, along with the MDEQ's ongoing sampling of fish and sediment cores.

**Amount of Contaminated Sediments**

Approximately 400,000 cubic yards.

Primary sediment contaminant: Mercury, up to 16 ppm dry weight.

**Total Cost**

Not available. MDEQ received a FY2000 CMI appropriation of \$4,000,000 for sediment cleanup activities at Deer Lake.

## **Saginaw River and Bay**

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### **Location**

The Saginaw River discharges into Saginaw Bay, which is a southwestern extension of Lake Huron located in the east portion of Michigan's lower peninsula. This AOC watershed encompasses 8,709 square miles in 22 counties and includes all of Saginaw Bay (1,143 square miles) out to its interface with open Lake Huron with an imaginary line drawn between Au Sable Point and Point Aux Barques.

### **Background**

Environmental problems in the Saginaw AOC are caused by eutrophication (nutrients), toxic substances (PCBs, dioxin and heavy metals), bacterial contamination, sedimentation and commercial/residential development. The federal government alleged that the contamination has been released from the General Motors facilities since the early 1970s, as well as from wastewater treatment plants in Bay City and Saginaw. Much of this ecosystem degradation results from poor land use practices. The sources that continue to contribute contaminants to the Saginaw River and Saginaw Bay include industrial and municipal discharges, combined sewer overflows (CSOs), contaminated sediments in the river and bay bottom, urban stormwater runoff, agricultural nonpoint sources, old waste disposal sites and the atmosphere.

Sediments in the lower river are contaminated with PCBs at levels less than 50 ppm and generally in the 1 to 20 ppm range. The PCB contamination was reportedly released from General Motors facilities and from wastewater treatment plants in Bay City and Saginaw (that received PCB-contaminated wastewater from GM).

### **Administrative History**

The Department of Justice, State of Michigan and U.S. Fish and Wildlife Service (FWS) announced in November 1998 that General Motors would spend \$28 million to restore and protect the Saginaw River and Bay area. The settlement was the result of a lawsuit filed by Natural Resource Trustees alleging that the release of PCBs had resulted in damages to the natural resources in the Saginaw area. The settlement provided \$10.6 million for dredging while the remainder of the settlement monies will be used for land acquisition.

### **Project Status**

Plan to remove approximately 350,000 cubic yards of contaminated sediment from five identified hot spots in the lower Saginaw River in 2000.

### **Total Cost**

Dredging will cost approximately \$8 million to \$9 million.



## **Torch Lake**

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### **Location**

Located in Houghton County, in the Upper Peninsula of Michigan, the Torch Lake Superfund Site encompasses 2,700 acres on the Keweenaw Peninsula. The site includes Torch Lake itself, the west shore of Torch Lake, a portion on northern Portage Lake, the Portage Lake Canal, the North Entry to Lake Superior, Boston Pond, and some other smaller areas located within the Keweenaw Basin. The Torch Lake watershed is approximately 78 square miles, comprising about 12% of the larger Portage Lake Basin. Due to the size and extent of the area, the Torch Lake Site has been broken down into Operable Units. Operable Unit I includes tailings at Lakes Linden, Hubbell and Mason; Operable Unit II is Torch Lake itself; and Operable Unit III includes tailings at Calumet Lake, Boston Pond, Michigan Shelter, Dollar Bay, Point Mills, Scales Creek and North Entry.

### **Background**

Between the years 1868 and 1968, Torch Lake was the home to large copper mining, milling and smelting operations, as well as a part of an industrial transport waterway. Waste and unwanted materials from these operations were pumped directly into Torch Lake or nearby waterways. At present, the concern at torch Lake is the presence of elevated levels of copper, arsenic, chromium, lead, zinc, creosote, coal tar derivatives and xanthates.

### **Administrative History**

In the 1970s, the Michigan Department of Natural Resources (MDNR), now the Michigan Department of Environmental Quality (MDEQ), sampled the lake, finding elevated levels of contaminated sediment. Fish samples were taken and analyzed in 1965, 1972, 1977 and 1980. In 1983, the International Joint Commission (IJC) designated Torch Lake as an AOC, and the Michigan Department of Public Health (MDPH) announced an advisory against the consumption of Torch Lake Sauger and Walleye. However, based on further studies of fish by MDEQ, the MDPH lifted the Torch Lake fish consumption warning early in 1993. In 1998, the Torch Lake Superfund Site was placed on the EPA's National Priorities List for funding under CERCLA.

### **Project Status**

EPA estimates that contaminated sediment in some areas may be up to 70 feet thick. The current ROD does not plan on remediating any sediments. Monitoring of sediment chemistry and toxicity will continue in order to get a better idea of the lake bottom. MDEQ will use this information to determine if natural recovery is possible.

**Total Cost**

In September 1998, U.S. EPA approved \$15 million in funding for the cleanup of the Torch Lake Superfund Site, which includes all of the Operable Units.

## **White Lake - Tannery Bay**

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### **Location**

White Lake is located in Whitehall, Muskegon County, Michigan. It is a recreational lake used for swimming, boating, etc. and also an Area of Concern (AOC), primarily due to sediments contaminated by past discharges of industrial chemicals.

### **Background**

High levels of mercury, chromium, and arsenic are present in sediments in Tannery Bay which is adjacent to a leather tannery. In addition to the sediment chemical contamination in the bay, tannery wastes such as pieces of hides and hair are present on the bottom of the bay and within sediments there. U.S. EPA funded toxicity studies conducted by Grand Valley State University et. al. in the 1990s which showed that sediments from Tannery Bay were toxic to laboratory test organisms. Studies conducted subsequent to the GVSU studies in 1999 by MDEQ/USEPA and the U.S. Army Corps of Engineers (USACE) confirmed the chemical and waste contamination noted by GVSU et. al. Through a partnership with the MDEQ and based on the aforementioned 1999 sampling, the USACE has developed a draft concept design report to address the contaminated sediments in Tannery Bay. The report lists a number of remedial alternatives and final remedy selection is underway.

### **Administrative History**

The tannery, as a potentially responsible party concerning the contamination in Tannery Bay, has not cooperated to date regarding the need to remove chemically impacted sediments and tannery wastes from the bay. Therefore, the MDEQ plans to develop final cleanup plans and specifications for this site. Once this is done (hopefully by fall 2000), the MDEQ will present this information to the company with a request that cleanup be initiated by the company by date certain. Should the company not cooperate, the MDEQ will implement the cleanup plan and attempt to recover costs from the company through legal means.

### **Amount of Contaminated Sediments**

80,000 to 100,000 cubic yards.

### **Project Status**

Remediation is expected to occur in either fall 2000 or spring 2001.

### **Total Cost**

4 to 8 million dollars.

## **St. Lawrence River - Reynolds Metals Site**

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### **Location**

Reynolds Metals Company (RMC) owns and operates an aluminum reduction plant in the town of Massena, New York. The facility is located on 112 acres of land near the St. Lawrence River within the St. Lawrence-Massena AOC.

### **Background**

The Reynolds facility manufactures aluminum ingots. Waste materials were historically landfilled, spilled, leaked, and otherwise released into the area, contaminating the soils, sediments, groundwater, surface water and air. The major pollutant of concern has been PCBs, although there were also cyanides, fluorides, and dioxin/dibenzofurans released. Contaminated areas on the site relating to sediments include:

- Black Mud Pond: used to contain slurry from the processing of spent potliners for cryolite recovery.
- Landfill/Former Potliner Storage Area: held spent potliners and is located immediately adjacent to wetlands.
- Wetlands: PCBs have migrated from the landfill into the wetlands.

### **Administrative History**

Although this site is not on the National Priorities List, U.S. EPA is responsible for the cleanup of the St. Lawrence River portion of the contamination. NYSDEC is the lead agency on the soil remediation. The river cleanup ROD was signed in September of 1993. This ROD calls for excavating 7 acres of sediments from wetlands and 1.5 acres of sediments from potliner storage pad. The contaminated material will be shipped off site for disposal.

### **Amount of Contaminated Sediments**

- Volume: 77,000 cubic yards
- Highest PCB Concentration: 2,000 ppm

### **Project Status**

Dredging of the contaminated sediments is expected to occur in 2001.

### **Total Cost**

The estimated cost for the sediment remediation is \$57,000,000.

## **Ashtabula River - Fields Brook Superfund Site**

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### **Location**

The Fields Brook Superfund Site is located approximately 55 miles east of Cleveland in the city and county of Ashtabula, Ohio.

### **Background**

The Fields Brook Site is a six square mile watershed where from 1940 to the present, up to 19 separate facilities operated. Activities ranged from metals fabrication to chemicals production. Fields Brook flows into the Ashtabula River, which flows into Lake Erie approximately 1-1/2 miles downstream of the site. Sediments of Fields Brook and soils of the Fields Brook flood plain/wetlands area are contaminated with a wide variety of contaminants including polychlorinated biphenyls (PCBs), chlorinated solvents and metals. Several industrial properties surrounding Fields Brook are potentially recontaminating Fields Brook sediment, which has contaminated Ashtabula River sediments. Approximately 23,000 people live within one mile of the site in the city of Ashtabula.

Fields Brook drains a six square mile area in the city, township and county of Ashtabula, in northeastern Ohio. The main channel is 3.9 miles long and begins at Cook Road, just south of the Penn Central Railroad tracks. From this point, Fields Brook flows northwest to Middle Road, then west to its confluence with the Ashtabula River. From Cook Road downstream to State Highway 11, Fields Brook flows through an industrialized area.

**Administrative History Site Responsibility:** This site is being addressed through Federal and Potentially Responsible Parties' action.

**NPL Listing History:** Proposed Date: 10/22/81  
Final Date: 09/08/83

Due to the possibility of direct contact with the sediment, movement of the contaminated sediment into the Ashtabula River and the possibility of uncontrolled releases of hazardous materials from the sediment entering the water supply of the City of Ashtabula, Fields Brook was added to the NPL by U.S. EPA in 1983.

In 1986 a final cleanup decision for the Fields Brook sediment operable unit was reached between U.S. EPA and the state. In 1989 U.S. EPA issued a Unilateral Administrative Order (UAO) to require the potentially responsible parties (PRPs) to design and implement the 1986 Record of Decision (ROD) for the Fields Brook sediment. Recognizing that contaminated sediment was only part of the problem, U.S. EPA

required the PRPs to also investigate the adjacent flood plain/wetland area and conduct a search for the source(s) of site contamination.

The investigation of the flood plain/wetland areas along Fields Brook found that contamination, especially PCBs, did extend into the soils adjacent to the Brook. U.S. EPA issued a ROD on June 30, 1997 to select the remedy for the flood plain/wetlands Operable Unit (OU). The remedy requires the excavation and disposal of PCB-contaminated soil in both industrial and residential portions of the OU. An on-site landfill will be built within the industrial area of the Fields Brook watershed to house PCB-contaminated soils and sediment from the site.

In August 1997 U.S. EPA issued an Explanation of Significant Differences (ESD) which modified the original 1986 ROD. The ESD eliminated the need for on-site thermal treatment by allowing off-site treatment of contaminated sediment. The ESD also decreased the volume of sediment requiring excavation and eliminated the solidification requirement for sediments to be landfilled.

On September 30, 1997 U.S. EPA issued a ROD to select remedies for six source areas that could potentially recontaminate the Brook. In general, remedies require excavation and containment.

In April 1999 U.S. EPA issued a Site-Wide Explanation of Significant Differences to update the cleanup decisions to address the presence of low-level radionuclides.

#### **Amount of Contaminated Sediments**

- Contaminants of Concern: PCBs, VOCs, PAHs, heavy metals (including mercury, lead, zinc and cadmium), and phthalates
- Highest levels: PCBs, 660 ppm
- Typical levels: PCBs, 11.9 ppm
- Volume of Contaminated Sediment: 12,100 cubic yards of sediment  
27,400 cubic yards of floodplain/wetland soils

VOCs and heavy metals have been detected in surface water from Fields Brook and the Detrex tributary. Contaminated sediments threaten drinking water intakes in Lake Erie. Contaminants detected in fish include VOCs and PCBs. The site poses a potential health risk to individuals who accidentally ingest or come into direct contact with contaminated water from Fields Brook and the Ashtabula River. Ingesting contaminated fish or sediments also may cause adverse health effects.

**Project Status Health Advisory:** Issued on March 1, 1983, recommending that people do not eat fish in a 2-mile reach of the Ashtabula River.

**Fish Advisory:** Issued in 1983, revised in 1997, recommending the restriction of consumption of walleye, freshwater drum, carp, steelhead trout, white perch, coho salmon, chinook salmon (19" and over), smallmouth bass, white bass, channel catfish and lake trout) due to high PCB and mercury levels found in fish tissue.

The Fields Brook Superfund remediation project is in the remedial design phase. Two of the source control cleanups (Conrail and Millennium) have already been completed. In 2000, a landfill will be constructed on-site to hold material which will be excavated from the brook and adjacent floodplain/wetland areas. This

landfill will also hold excavated material from the remaining source control operable units which will be cleaned up in 2000. Excavation of Fields Brook is expected to commence in late 2000, with work ending in 2001.

Sediment-related cleanup work at Fields Brook Site is expected to proceed according to the following schedule: Fields Brook Sediment and Flood Plain/Wetland Soils - The 100% design is currently being finalized based on U.S. EPA, Ohio EPA, U.S. Army Corps of Engineer and U.S. Fish and Wildlife Service comments. Construction of an on-site landfill is expected to begin in the Spring of 2000. Following completion of the landfill, excavation of Fields Brook soil and flood plain/wetland sediment will begin. The major components of the brook and flood plain/wetlands cleanup are expected to be completed by the end of 2001, with some restoration, inspection and reporting activities left to be addressed in 2002. Source control cleanups should be completed by 2001.

**Total Cost**

The tributary remediation project is expected to cost between \$5,000,000 and \$6,000,000.

## **Ashtabula River and Harbor (downstream of Fields Brook Superfund Site)**

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### **Location**

The site consists of the lower two miles of the Ashtabula River which flows through northeastern Ohio and empties into Lake Erie at Ashtabula Harbor in the city of Ashtabula. Ashtabula is located between Cleveland, Ohio and Erie, Pennsylvania.

### **Background**

From the 1940s through the late 1970s unregulated discharges and mismanagement of hazardous waste caused the river to become seriously contaminated and degraded its biological communities. Various point and non-point industrial sources are believed to have contaminated sediments in the river with a variety of organic and heavy metal pollutants, with the main contaminant of concern being PCBs. Regular dredging is being prevented due to the contaminated sediments, seriously impeding both commercial and recreational navigation. Since 1983, a fish consumption advisory has been posted for the Area of Concern (AOC). Sediment contaminants have transferred to fish, affected habitat quality and restricted lower Ashtabula River commercial and industrial use. A fish advisory is in effect resulting from mercury and PCB contamination.

In 1998 the Ashtabula River RAP Advisory Council agreed to focus upon an AOC defined as the lower two miles of the Ashtabula River, Ashtabula Harbor and the adjacent Lake Erie nearshore. The Ashtabula River has been declared an AOC by the IJC. The Lower River and Harbor are being addressed via a comprehensive public and private partnership with U.S. EPA, OEPA, USACE, USFWS, industry and the public. However, the Fields Brook Site is being remediated separately under a Superfund Action. The Ashtabula River Partnership was formed in 1994 to unite the diverse community involved in Ashtabula River and Harbor sediment remediation.

### **Administrative History**

CERCLA/SARA, including Natural Resource Trustee issues, CWA 404, and NPDES permit needed for the sediment/water treatment.

### **Amount of Contaminated Sediments**

- Contaminants of Concern: PCBs, PAHs, radionuclides
- Highest Concentrations: 600 ppm PCBs
- Typical Concentrations: 12-20 ppm PCBs
- Mass: 11,000 kg of PCBs
- Volume: approximately 500,000 cubic yards



**Project Status**

The Partnership's proposed plan and Environmental Impact Statement for the lower river and harbor sediment remediation project was released to the public in September 1999. The EIS includes various remediation alternatives, selected sites for the CDF, estimated costs and potential cost distribution between industry and government. Dredging and site remediation is expected to begin in 2002.

**Total Cost**

The current cost estimate in the draft EIS is \$42 million, not including NRDA claims/issues.

## **Milwaukee Estuary AOC: Little Menominee River - Moss-American Superfund Site**

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### **Location**

From 1921 until 1967, the wood preserving facility on this site used creosote and fuel oil in their processes. The facility discharged their wastes to settling ponds that ultimately released into the Little Menominee River. The soils and sediments in the settling ponds and river were contaminated with creosote during this time. The original facility was purchased by Kerr-McGee in 1963 and became Moss-American. The site was renamed in 1974 to Kerr-McGee Chemical Corporation - Forest Products Division.

### **Administrative History**

In 1971, Moss-American diverted its process water discharge from the river to the Milwaukee sanitary sewerage system. Also in 1971, WDNR ordered Kerr-McGee to clean eight settling ponds and dredge 1,700 feet of the river after creosote contamination was discovered. The settling ponds were filled with clean soil, the discharge pipe to the river was removed, and a 12-foot deep underground clay retaining wall was constructed between the ponds and the river.

In 1973, U.S. EPA financed the dredging of approximately 5,000 feet of the river, storing most of the creosote-contaminated sediments in an onsite landfill. The facility closed in 1976. Milwaukee County reached a settlement with Kerr-McGee after the facility closed, in which the county received a major portion of the property as payment for the dredging of the river. This land was converted into a park corridor along the river.

However, sampling in the 1970s and 1980s by U.S. EPA and other agencies indicated high levels of creosote contamination remaining in the soils and sediments. Contaminants detected in the sediments were primarily polynuclear aromatic hydrocarbons (PAHs), similar to the contamination found in the soils. Sediment contamination was on average 18 ppm PAHs. These sediments were found distributed throughout the five mile reach of the river between the site and its confluence with the Menominee River.

The site was placed on the NPL pursuant to CERCLA. The RI/FS was therefore funded by Superfund and was completed in May 1990. The ROD for the site was signed on September 27, 1990.

### **Amount of Contaminated Sediments**

- Volume: 15,000 cubic yards
- Highest Total PAH Concentration: 5,900 ppm

**Project Status**

The schedule for this project is uncertain. The project may move to design stage in 2000 and active sediment management in 2001. Construction of a groundwater system began in 1999 and is expected to be completed by April 2000.

**Total Cost**

The estimated cost for remediation is \$26,000,000, including an annual operation and maintenance cost of \$130,000. The sediment management portion of the project is estimated at \$12,000,000.

## **Sheboygan River and Harbor Superfund Site**

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### **Location**

The Sheboygan River and Harbor Site extends approximately 14 miles through the communities of Sheboygan Falls, Kohler, and Sheboygan, Wisconsin. The site area includes Sheboygan Harbor, located on Lake Michigan, and the lower Sheboygan River, which discharges into the Sheboygan Harbor.

### **Background**

In 1977 the State of Wisconsin detected polychlorinated biphenyls (PCBs) during routine sampling of fish. Since then, PCBs have been detected in fish, wildlife, surface water, sediments in the harbor and river, and in flood plain soils. The highest concentrations of PCBs have been detected in sediments immediately downstream from the Tecumseh Products Company plant (named as a Potentially Responsible Party (PRP)) in Sheboygan Falls. Concentrations decline farther downstream from the plant. The PRP excavated PCB-contaminated soils from its property along the river and disposed of them offsite in 1978. The Sheboygan River drains into Lake Michigan, the source of drinking water for approximately 58,000 people within the Sheboygan/Sheboygan Falls/Kohler metropolitan area. People who come in direct contact with or ingest contaminated soil, sediments or surface water may be at risk. People who eat contaminated fish or waterfowl may also suffer adverse health effects. In 1978, the State advised residents not to eat fish from the Sheboygan River and two tributaries, the Mullet and Onion Rivers, because of PCB contamination. In 1987, the State also issued an advisory not to eat wildlife from the area. The advisories are still in effect.

### **Administrative History**

The site was proposed for the National Priority List (NPL) in September 1985 and was finalized in June 1986. In 1986, the U.S. EPA and the State signed a Consent Order with the PRP, requiring the PRP to conduct an investigation at the site to determine the nature and extent of contamination and to identify and evaluate remedial alternatives to address the problem.

Investigative studies were concluded in 1996. The studies concluded that sediments are contaminated with PCBs and a wide variety of heavy metals. In addition, soils near the water's edge (flood plain soils) and surface water are contaminated with PCBs and heavy metals including arsenic, chromium, copper, lead and zinc. People who come in direct contact with PCBs, or people who eat contaminated fish or waterfowl may suffer health effects. From 1989 to 1990 the PRP dredged approximately 3,800 cubic yards of contaminated sediments from the Upper Sheboygan River. The PRP has stored the sediments in two containers on site: a confined treatment facility (CTF) and a sediment management facility (SMF). The CTF is being used for studies to evaluate the feasibility of biodegradation of PCBs in place. The SMF is designed for temporary storage of the remaining dredged sediments until they can be disposed of properly. During the period

between 1989 and 1990, eight other sediment deposits were “armored” in the Upper Sheboygan River. These areas were covered with several layers: a geotextile fabric, run of bank material, cobble and wire cages filled with rock (gabions) in order to prevent the PCB-contaminated sediment from moving downstream. These activities were summarized in a report entitled Alternative Specific Remedial Investigation (ASRI). The ASRI was prepared by the PRP and finalized in October 1995.

The Feasibility Study was accepted by the U.S. EPA in January 1999 and the U.S. EPA Proposed Plan was issued for public comment in May 1999.

#### **Amount of Contaminated Sediment**

##### **Removal Action - 1989 to 1990**

Volume: 3,800 cubic yards

Highest PCB Concentration: 4,500 ppm

##### **Estimated Remedial Action - 2002 to 2010**

Sediment Volume - Upper River: 22,000 cubic yards

Highest Estimated PCB Concentration: 2,700 ppm

Floodplain Soil Volume: 11,000 cubic yards

Highest Estimated PCB Concentration: 50 to 200 ppm

Sediment Volume - Lower River and Inner Harbor: 53,000 cubic yards

Highest Estimated PCB Concentration: 100 ppm

#### **Project Status**

The ROD was signed on May 12, 2000. Special Notice Letters will be sent to Potentially Responsible Parties in late July 2000. The Natural Resource Trustees (WDNR, U.S. Fish and Wildlife Service and NOAA) will meet in late July 2000 to discuss Natural Resource Damages at Sheboygan. Negotiations for both the Federal Remedy and Natural Resource Damage concerns are expected to take 2 to 4 months. It should be known by late November 2000 which PRP will be implementing a remedy at the site. Remedial Design is expected to begin in early 2001, with dredging beginning in 2002.

#### **Total Cost**

Estimated costs are \$41,000,000, funded by Responsible Parties.

## **BENEFITS OF SEDIMENT REMEDIATION**

This report demonstrates that we are advancing in the realm of sediment remediation. As more sites are being remediated and greater volumes of sediment are being removed from sites within the Great Lakes Basin each year, it is becoming important to understand the benefits of these remediation projects. In most Areas of Concern, sediment remediations have not been followed up with post-remediation studies to document improvements to the site. Two instances where this has been done are the Black River in Ohio and Waukegan Harbor in Illinois.

A number of post-remediation studies have been conducted on the Black River. The most recent was conducted by the USGS, with the help of a grant from U.S. EPA's Great Lakes National Program Office (GLNPO). Sediment sampling was conducted on the Black River in the fall of 1997, and fish samples were collected in the spring of 1998. The results of this study indicate that PAH levels in both sediment and fish have declined since the early 1980s. This can be attributed to the fact that the major point source to the Black River, a coking plant, was closed in 1983, and to the fact that remedial dredging removed over 50,000 cubic yards of contaminated sediment in 1989-1990. The results of a fish study conducted two and three years after the dredging of the Black River showed a high prevalence of tumors in fish, which indicated that these fish were adversely affected by PAH-contaminated sediments which they were exposed to during the dredging which had previously been buried. However, the results of the 1998 fish study in the Black River, eight years after the dredging took place, show that liver cancers are at their lowest documented levels, and that the percentage of fish with normal healthy livers is almost 70%, as opposed to 20% in the early 1980s. The results of this study indicate that both the closure of the coke plant and the remedial dredging of the contaminated river, although initially exposing fish to previously buried contaminated sediments, had beneficial results on the Black River.

Illinois EPA conducted some post-remediation monitoring at the Waukegan Harbor Site. The remediation at Waukegan consisted of the removal of over 38,000 cubic meters of contaminated sediment, including approximately 1 million pounds of PCBs. The study conducted by Illinois EPA found that PCB levels in fish declined significantly as a result of the cleanup. This led to the removal of the fish advisory at the harbor. The USGS also conducted a recent study in Waukegan Harbor, concentrating on sediment toxicity. The results of this study indicate that, while contaminants in the sediment still causes some sublethal effects on organisms, PCB concentrations and sediment toxicity were lowered by the remediation which took place at Waukegan. In addition, property values in the area have increased.

These two examples suggest the environmental and economic benefits of sediment remediation. It is important, however, that post-remediation sampling and monitoring be conducted at additional sites in order to further demonstrate these benefits. Additional information on the two above-mentioned sites, and on the possible benefits of sediment remediation can be found at the following web sites:

- <http://www.ijc.org/boards/wqb/cases/studies.html>
- <http://www.ijc.org/boards/wqb/ecolsed/index.html>
- <http://www.ijc.org/boards/wqb/sedpacbroc/index.html>